A CORRELATIVE CYTOLOGICAL AND HISTOPATHOLOGICAL STUDY ON LESIONS OF THYROID GLAND

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Department of Pathology,
Madurai Medical College and
Government Rajaji Hospital,
Madurai.

CERTIFICATE

This is to certify that the dissertation entitled **"A CORRELATIVE CYTOLOGICAL AND HISTOPATHOLOGICAL STUDY ON LESIONS OF THYROID GLAND**" presented herewith by **Dr.SIVAELANGOVAN .R.** to the faculty of Pathology,The Tamilnadu Dr.M.G.R.Medical University, Chennai in partial fulfillment of the requirement for the award of M.D degree in Pathology is a bonafide work carried out by him during the period January 2010 –May 2012 under my direct supervision and guidance.

Dr. USHA RAVIKUMAR M.D.,
Professor & Head of the Department,
Department of Pathology,
Madurai Medical College,
Madurai.20

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INTRODUCTION

The Thyroid gland is unique among the endocrine glands. It is the largest of all the endocrine glands and it is superficial in location. It is the only gland which is easily approachable to direct physical, cytological and histopathological examination.

The thyroid gland is affected by a variety of pathological lesions that are manifested by various morphologies including developmental, inflammatory, hyperplastic and neoplastic pathology which are quiet common in the clinical practice.

Lesions of thyroid are so common and it presents as diffuse enlargement or solitary or multiple nodules. As the Incidence of malignancy presenting on thyroid lesion is quiet low when compared with the overall incidence of thyroid nodular lesions. Emphasis is placed upon to find diagnostic modalities that may improve the ability to differentiate between nonneoplastic and neoplastic lesions and differentiation of benign and malignant lesions .

Fine Needle Aspiration Cytology has been established as the investigation of choice in thyroid lesions. It has excellent patient compliance ,simple and quick to perform in outpatient department and is cost effective with high degree of sensitivity and specificity.

The main indications for Fine Needle Aspiration Cytology are

1. Diagnosis of diffuse non toxic goiter.

2. Diagnosis of the solitary or dominant nodule of thyroid.

3. Confirmation of clinically obvious malignancy of thyroid.

4. To obtain material for special laboratory investigations at defining prognostic parameters.

There is continuous discussion for appropriate interpretation and management of thyroid lesions. A need to address these argument and to provide a clinically applicable with cost effective approach to the evaluation of thyroid lesions and its management has prompted to take up this study "A Correlative cytological And Histopathological Study On Lesions Of Thyroid Gland " in our centre at Madurai Medical College and Govt. Rajaji Hospital, Madurai.

False positive and false negative results were compared with other large series of studies. Limitations of Fine Needle Aspiration Cytology in distinguishing thyroid lesions harbouring non neoplastic, benign and malignant neoplastic lesions were noted.

Fine needle aspiration cytology is a safe as well as cost effective tool in the study of thyroid lesions. Observations strongly support that Fine needle aspiration

cytology should be the initial investigation of thyroid disease and we should embrace this diagnostic procedure in the management of thyroid lesions.[23]

Touch Imprintprint cytology was also done immediately after receiving the operated specimens. Then the results were noted and Histopathological correlation was done for all these cases.

False positive and false negative results were compared with other large series of studies. Limitations of Fine needle aspiration cytology(FNAC) and Touch Imprintprint cytology in diagnosing thyroid lesions were noted.

Immuno Histo Chemistry (IHC) was also performed in some cases with Ki-67 . This study was conducted to assess the utility of Ki-67 as a proliferation marker in nonneoplastic and neoplastic lesions of thyroid.

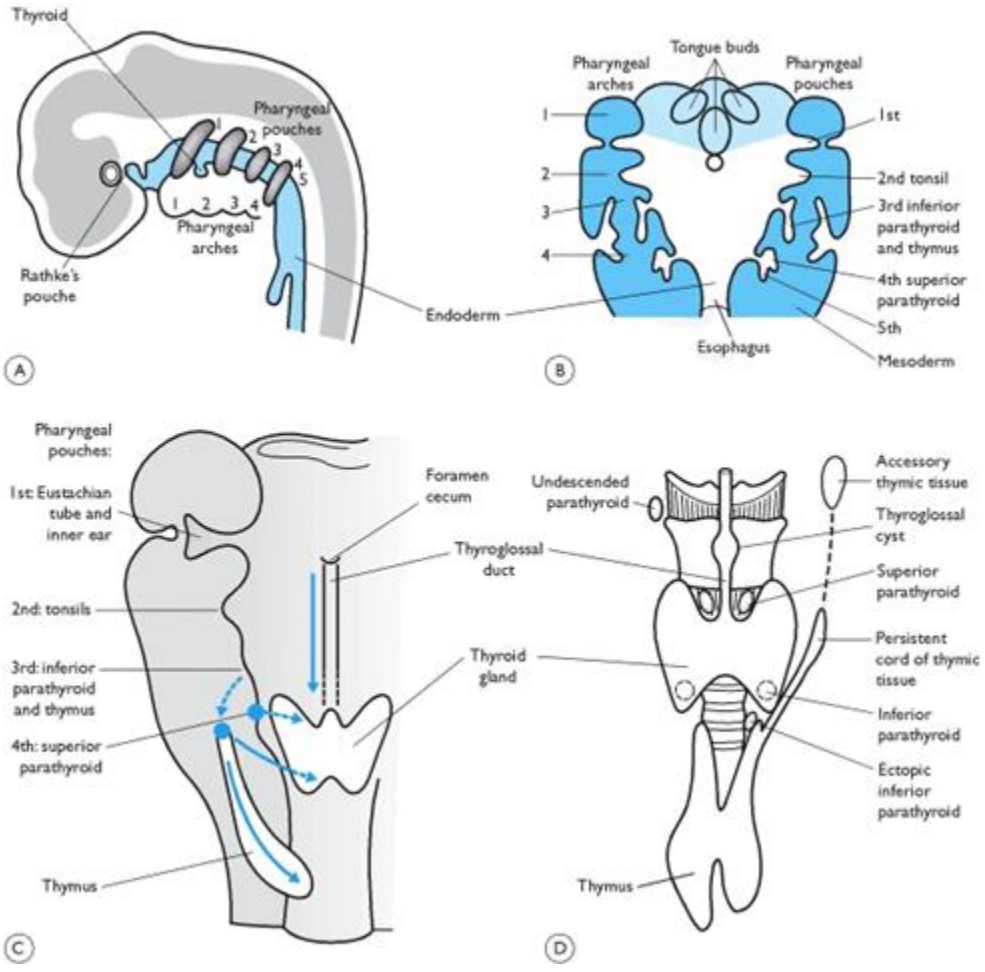
AIM OF THE STUDY

- To study the cytological and histopathological correlation of thyroid lesions.
- To study the incidence in relevance to age, sex in various categories of thyroid lesions.
- To evaluate the accuracy of Fine needle aspiration cytology and Touch Imprint cytological study in correlation with histopathological study.
- To analyze the false positive and false negative results of Fine needle aspiration cytology with relevance to the thyroid lesions.
- To determine and evaluate the causes for false positivity and negativity and to arrive at possible suggestions to minimize the percentage in this regard.
- To study the advantages and usefulness of Fine needle aspiration cytology (FNAC) in thyroid lesions.
- To assess the advantages and usefulness of Touch Imprint cytological study in the diagnosis of thyroid lesions.
- To study the role of Immunohistochemical proliferative marker Ki 67 in thyroid lesions.

REVIEW OF LITERATURE

The thyroid gland is unique among endocrine glands. It is the first endocrine gland to appear in the foetus. It is the largest of all endocrine glands weighing about 25grams and is the one which is amenable to direct physical examination because of its superficial location.

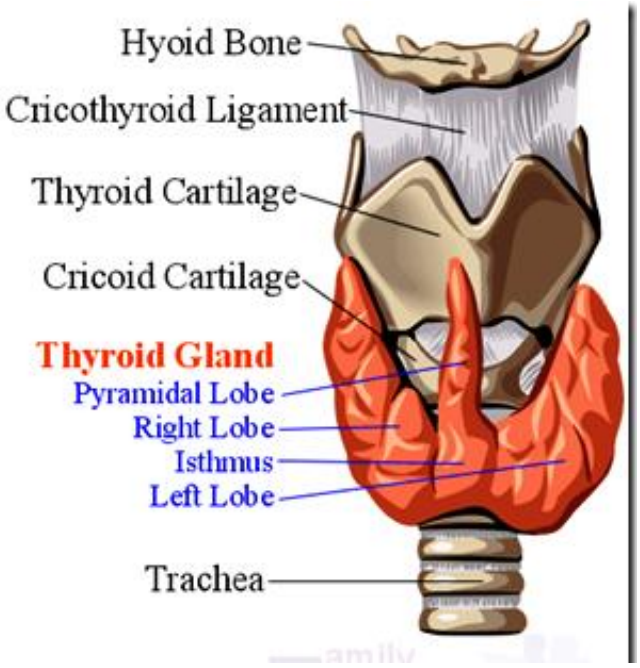
Embryology:



The thyroid anlage appears in the embryo as a midline structure at the site corresponding to the thyroglossal duct along the midline to reach its final position in the mid neck.

The thyroid parenchyma including the parafollicular cells (C Cells) originates from the medial pharyngeal precursor i.e. the ultimo bronchial body, which is derived from fourth and fifth pharyngeal complex. As the foetal thyroid gland develops the endodermal cells rapidly replicate forming cords and trabeculae that later transform into follicular structures.

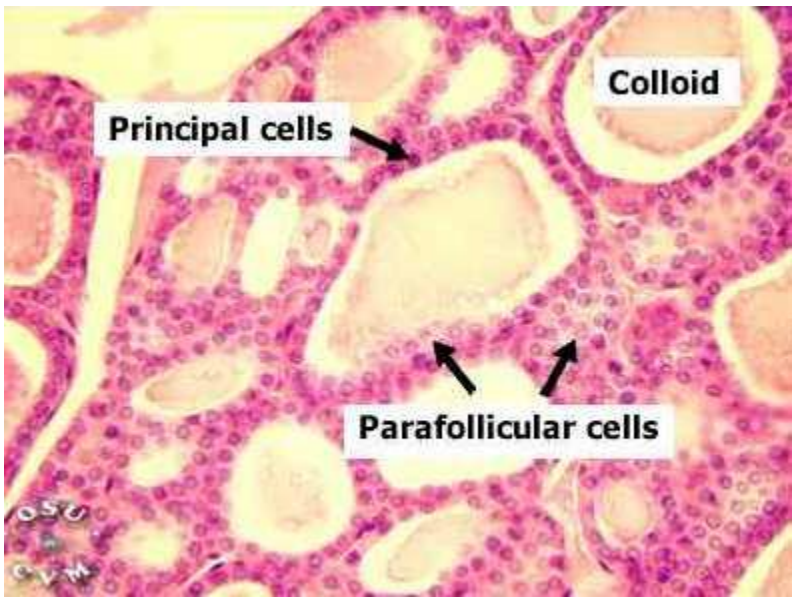
Anatomy:



The thyroid has a reminiscent of a butterfly consisting of two bulky lateral lobes. (average dimension 4.5 x 2 cms) connected by a relatively thin isthmus. Left lobe is shorter than Right lobe. Pyramidal lobe is vestige of thyroglossal duct present in 40-55% . A thin delicate capsule invests the gland. From this capsule, numerous stromal septa of various thickness penetrates the thyroid parenchyma and irregularly dividing into lobules. Each lobule consists of approximately 20-40 individual follicles[16].

Histology:

The gland is composed of closely packed thyroid follicles lined by cuboidal epithelial cells. The follicular cells secrete and store their products in lumen called colloid composed of thyroglobulin. In addition parafollicular cells are also seen in the thyroid follicles as well as in the inter follicular space.



Fine Needle Aspiration Cytology of Thyroid Gland:

The concept of Fine Needle Aspiration Cytology (FNAC) was first introduced by Martin and Ellis in 1930 at Memorial Sloan - Kettering Hospital. In India this FNAC technique was first introduced at Chandigarh in the early seventies followed by All India Institute of Medical Sciences, New Delhi, in the mid seventies.

FNA biopsy can be defined as "Removal of a sample of cells, using a fine needle from a suspicious mass for diagnostic purposes". It is simple, accurate, economic as well as safe procedure. Because of patients acceptance of the procedure Fine Needle Aspiration Cytology has now become the common initial screening test for the patients with thyroid disease.

Awareness of the limitations of any diagnostic procedure is most important and it should be stressed that Fine needle aspiration cytology is not a substitute for conventional surgical histopathological examination. The two fundamental elements required for the success of FNAC depends on proper representation of the sample and high quality of smear preparations. In addition information obtained by Fine needle aspiration cytology must always be correlated with other investigations .

Goiters (from the Latin Gutter, throat) have been known since 2700 B.C long before thyroid gland was recognized. The gland was first documented by the Italians of the Renaissance period. Leonardo da Vinci originally depicted the thyroid in his drawings as two separate glands on either side of the larynx. The term thyroid gland (Greek thyreoeides, shield shaped) is attributed to Thomas Wharton in his Adenographia (1656). Albrecht Von Hailer in 1776 classified the thyroid as a ductless gland.

For over 100 years the discipline of anatomical pathology has entered on diagnostic histopathology and this in turn on the surgical biopsy. For the last 60 years exfoliated and abraded samples of cells have also been collected from accessible anatomical surfaces, especially from the uterine cervix and the bronchus. Thus a diagnostic discipline has arisen in parallel with histopathology which subserves both a screening and a predictive function.

In 1883 Leyden et al and 3 years later Menetrier employed needles to obtain cells and tissue fragments, the former was to isolate pneumonic microorganisms and the latter to diagnose pulmonary carcinoma.

In 1919 Hirschfeldt H et al study revealed the wide acceptance of needling the bone marrow as an integral part of the investigation of haematologic problems which continued to serve as a reminder that almost every tissue could be sampled

by an easily acquired technique requiring neither anaesthesia nor the intervention of surgeons.

Martin and Ellis of the Memorial Hospital of Cancer and Allied Diseases, Newyork in 1930 first reported FNAC of the thyroid gland. However this technique did not gain widespread acceptance in North America for 5 decades.

The modern use of the technique originated in Scandinavia in the 1950s and 1960s. Various world literature supporting to its advantages and accuracy of FNAC .Meticulous attention to technique and limitations in diagnosis by FNAC were also reported.

The first major study by an Indian was the one done by Rao SK et al[40], where about 341 cases of solitary thyroid nodules were evaluated over a period of 10 years from 1957 to 1966.

Zajicek in collaboration with Franzen at the Karolinska Hospital 1974, defined precise cytologic criteria and accuracy in a variety of conditions.

In 1977, Marvin et al of france have emphasized the importance of FNAC in pre-operative diagnosis of thyroid nodules. In the same year walfish PG of England made a prospective study of combining ultrasonography with FNAC in cases of hypo functioning thyroid nodules.

Lowhagen T et al (1979) stated that even in the hands of experienced cytopathologist approximately 5-10% of cancers will not be diagnosed by FNAC. The greatest risk of a false negative diagnosis was related to cystic neoplasms mainly cystic papillary carcinoma. Over 40% of cystic neoplasms may be missed by Fine Needle Aspiration Cytology.

In 1982 Bhansali Sk et al in his extensive study evaluated 600 cases of solitary nodules based on the clinical examination, scintiscan and cytology. Accordingly the incidence of malignancy was found to range between 5% to 25%.

In 1983 Charry analyzed 120 cases of thyroid nodules and found a high prevalence in women of age group between 21-40 years.

In 1984 Ghoshal B et al described the use of FNAC in differentiation of benign and malignant cold nodules.

La Rosa et al (1991) found a false negative rate of 6.4% for cystic nodules where as it was 1.4% for solid nodules. False negative diagnoses also arise from inadequate samples, improper sampling technique, dual pathology (example a dominant benign nodule may obscure a smaller or more diffusely growing carcinoma) and errors in interpretation.

Review of literature by various authors during last ten years

Author	**Conclusion**
Amrikachi M et al[3] (2001)	FNAC - High accuracy and has a low rate of false negative and false positive diagnosis
Kaur K et al in 2002[23]	FNAC -Single best preoperative investigation for differentiation between benign and malignant lesions.
B. Mundasad et al[31] in 2006	FNAC -Gold standard initial investigation in the diagnosis of thyroid swellings.
YS Cheung et al[56] 2007	High diagnostic accuracy of FNAC can be achievied by good aspiration technique and availability of well experienced cytologists .
Xin Jing et al [55]in 2008	More diagnostic consistency can be achieved by after implementing the standard criteria for assessment of specimen adequacy and terminology (CAST) in FNAC

Author	Conclusion
Suresh K et al [51] in 2008	FNAC - Safe, reliable and accurate method as a first line pre operative evaluation in thyroid nodules
Manoj Gupta et al[26] in 2010	FNAC can be easily repeated technique for the diagnosis of thyroid cancer and the commonest malignancy detected was papillary carcinoma
Bista M et al[4] in 2011	Fine needle aspiration cytology of thyroid should be performed in all cases of thyroid nodules to differentiate malignant from benign lesions.
E.A. Sinna et al [9] in 2012	Fine needle aspiration cytology - more specific ,sensitive, and accurate initial diagnostic test for thyroid lesions.
Shirish C et al [48] in 2012	FNAC thyroid -Gold standard preoperative assessment of thyroid nodules. Early and accurate diagnosis reduces the unnecessary surgical intervention, morbidity and mortality.

LESIONS OF THYROID

THYROID LESIONS

NON NEOPLASTIC LESIONS

Infectious Thyroiditis

- Acute Thyroiditis
- Chronic Thyroiditis

Hashimato Thyroiditis

Subacute Thyroiditis

Grave's Disease

Goitre

- Diffuse non toxic goiter
- Multi Nodular goiter

NEOPLASTIC LESIONS

Benign

- Follicular adenoma
- Hurthlecell Adenoma

Malignant lesions

- Papillary Carcinoma
- Medullary Carcinoma
- Follicular Carcinoma
- Anaplastic Carcinoma

Infectious thyroiditis

Acute thyroiditis.

Most cases are caused by bacterial infection. Due to Hematogenous spread or through direct seedling of the gland. Microscopically, there is neutrophilic infiltration of the gland seen. In severe cases abscesses are also present.

Chronic thyroiditis

Chronic thyroiditis occur in immunocompromised patients due to mycobacterial, fungal, and pneumocystis infections.

Subacute granulomatous thyroiditis.

Subacute thyroiditis, which is also known as De Quervain`s thyroiditis. The most common affected age group is 40 -50years . It affects women more frequently than men (4 : 1).

Cytological Criteria for diagnosis

- Large multinucleate giant cell with numerous nuclei, phagocytosed colloid (Fig-1)
- Epithelioid cells.
- Degenerating follicular cells.
- Inflammatory cells, macrophages and lymphocytes .
- A dirty background of debris and colloid.

The gland may be enlarged either unilaterally or bilaterally. Firm in consistency, usually with an intact capsule. Cut surface shows yellow-white firm areas and these affected areas stand out from the normal thyroid parenchyma.

Microscopically the changes usually patchy and depends upon the stage of the disease. In the early active inflammatory phase,the scattered follicles are completely disrupted and may be replaced by polymorphs forming microabscesses. In later stage, the more characteristic features may appear in the form of aggregates of lymphocytes, plasma cells and activated macrophages around damaged and collapsed thyroid follicles. Multinucleate giant cells may enclose naked pools or fragments of colloid, hence the name granulomatous thyroiditis (Fig-2). In later stages of the disease, fibrosis occurs.

Hashimoto thyroiditis. (**Hashimoto's disease, struma lymphomatosa)**

Hashimoto thyroiditis is one of the most common immunologically mediated disorder of the thyroid. First described by Hakaru Hashimoto in 1912 [30]. This disorder is most prevalent between the ages of 45 -65 years. Hashimoto thyroiditis is common in women when compared to men. It has Female predominance with a ratio of 10 : 1 to 20 :1.

Cytological Criteria for diagnosis (Fig-3,4)

- Oxyphilic transformation of epithelial cells (askanazy cells)
- Moderate number of lymphocytes and plasma cells
- Scanty or no colloid

The thyroid is often diffusely enlarged with intact capsule. The gland is well demarcated from the adjacent structures. Usually the cut surface appears pale, yellow tan and firm (Fig- 5).

Histologic examination shows extensive infiltration of the thyroid parenchyma with mononuclear inflammatory cell infiltrate containing lymphocytes, plasma cells, and well-developed germinal center formation(Fig-6) . The follicles are atrophic and are lined by Hurthle cells**.** These epithelial cells are distinguished by the presence of abundant eosinophilic, granular cytoplasm. This change is a metaplastic response of the normally low cuboidal thyroid follicular epithelium to ongoing injury. Hashitoxicosis shows features of both Hashimoto thyroiditis and Graves disease.

Graves' disease - (Diffuse toxic goiter)

This is one of the common immunologically mediated disorder of the thyroid. Graves disease has a peak incidence between 20 to 40 years of age. women are affected as much as 10 times more frequently than men.

Cytological Criteria for diagnosis

- Blood stained smear with scanty colloid
- Moderate amounts of thyroid follicular epithelial cells
- Cells have abundant vacuolated pale cytoplasm with mild nuclear enlargement and showing moderate anisokaryosis.
- Fire flares/colloid suds/marginal vacuoles

Grossly,the thyroid gland is enlarged symmetrically because of diffuse hyperplasia with hypertrophy of thyroid follicular epithelial cells . On cut section the parenchyma appears as a soft and looks like normal muscle tissue.

Histologically, the thyroid follicular epithelial cells appear taller and more crowded than usual in untreated cases. This crowding of thyroid follicular epithelial cells results in the formation of small papillae (lack fibrovascular cores) which may project into follicular lumen .The colloid within the follicular lumen is pale with scalloped margins. Lymphoid infiltrates consisting predominantly of T cells with fewer B cells and mature plasma cells are present throughout the interstitium.

Goiters

Enlargement of the thyroid or Goiter is the most common manifestation of thyroid disease.

DIFFUSE NONTOXIC GOITER (SIMPLE GOITER)

Diffuse nontoxic goiter (Simple Goiter) causes enlargement of the entire gland without producing nodularity.

Cytological Criteria for diagnosis

- Abundant colloid of varying thickness or excessive thick colloid with normal Cytological appearance of follicular cells.

Two phases can be identified in the evolution of diffuse nontoxic goiter hyperplastic phase and phase of colloid involution. In the hyperplastic phase,the thyroid gland is diffusely and symmetrically enlarged although the increase is usually modest and the gland rarely exceeds 100 to 150 grams. The follicles are lined by crowded columnar cells which may pile up and form projections. In theInvolutary phase cut surface appears as brown. Histologically the follicular epithelium is flattened and cuboidal with abundant colloid .

MULTINODULAR GOITER :

Repeated episodes of hyperplasia with involution combined to produce more irregular enlargement of the thyroid gland producing Multinodular goiter.

Cytological Criteria for diagnosis (Fig-7,8)

- Abundant thin and thick colloid.
- Small to moderate number of follicular epithelial cells in monolayered sheets, poorly cohesive groups and single cells.
- Both Involutional and hyperplastic follicular epithelial cells often some Oxyphilic cells.
- Fragile cytoplasm.
- Variable number of histiocytes.
- Degenerative changes:old blood,debris.

Grossly Multinodular goiters are multilobulated, asymmetrically enlarged glands that can reach weighs of more than 2000 grams. Cut section shows irregular nodules containing variable amounts of brown gelatinous colloid. Older lesions have areas of hemorrhage, calcification, fibrosis and cystic change. (Fig-9)

Microscopically colloid rich follicles lined by flattened inactive epithelium and areas of follicular hyperplasia , areas of degenerative changes like hemorrhage, calcification, fibrosis, and cystic change. (Fig-10)

TUMORS OF THE THYROID GLAND

World Health Organization (WHO) classification (2004) Of Tumors of the thyroid gland is enclosed in Annexure-II

Benign tumors:

Follicular adenoma.

It is the most common tumor of the thyroid derived from follicular epithelium hence they are known as Follicular adenoma .

- **Cytological Criteria for diagnosis**(Fig-11,12)
  - Cellular often bloody smear.
  - Many equal sized epithelial cell clusters scattered throughout the smear.
  - Syncytial aggregates, nuclear crowding and overlapping.
  - Micro follicles.
  - Scanty or no colloid.

The typical thyroid adenoma is a solitary, spherical, encapsulated lesion that is well demarcated from the surrounding thyroid parenchyma (Fig-13). On freshly resected specimens the adenoma bulges from the cut surface and compresses the adjacent thyroid. The colour ranges from graywhite to redbrown depending on the cellularity of the adenoma and its colloid content.

Microscopically, the tumor cells are often arranged in uniform appearing follicles that may contain colloid . The follicular growth pattern within the adenoma is usually quite distinct from the adjacent non-neoplastic thyroid. The epithelial cells composing the follicular adenoma reveal little variation in cell and nuclear morphology. The hallmark of all follicular adenomas is the presence of an intact well-formed capsule encircling the tumor. (Fig-14)

The most common patterns seen in follicular adenomas are as follows

- Trabecular (embryonal),
- Microfollicular (fetal),
- Normofollicular (Simple),
- Macrofollicular (Colloid**)**.

The most important variants of follicular adenomas are

- Hurthle cell adenoma,
- Adenoma with clear cell change,
- Signet-ring cell adenoma,
- Hyalinizing trabecular adenoma,
- Adenoma with bizarre nuclei ,
- Adenoma with papillary hyperplasia ,
- Atypical adenoma,
- Adeno lipoma,
- Adeno chondroma.

PAPILLARY CARCINOMA

Papillary carcinomas are the most common form of thyroid cancer accounting for nearly 85% of primary malignant thyroid neoplasm. They occur throughout life but most often between the ages of 25 -50years.

Cytological Criteria for diagnosis (Fig-15,16)

- Cellular smears
- Syncytial aggregates and sheets of cells with a distinct anatomical border.
- Papillary tissue fragments with or without a fibrovascular core
- Enlarged ovoid strikingly pale nuclei, finely granular powdery chromatin

- Multiple distinct nucleoli , intranuclear cytoplasmic inclusions and nuclear grooves
- Dense cytoplasm with distinct cell border.
- Scanty viscous and stringy colloid(chewing gum colloid)
- Squamoid or histiocyte-like metaplastic epithelial cells
- Psammoma bodies
- Macrophages and debris

Grossly presents as solitary or multifocal lesion (20% of cases), encapsulated (10% of cases) or infiltrative lesion with variable degenerative changes like fibrosis, calcification and cystic degeneration. The cut surface sometime shows papillary foci that maybe useful to point the diagnosis. (Fig-17)

Microscopically branching papillae have fibrovascular stalk covered by single to multiple layers of epithelial cells. In many of them, the lining epithelium of the papillae consists of well-differentiated, uniform and orderly arranged cuboidal epithelial cells. (Fig-19)

The nuclei of tumor cells show finely dispersed chromatin, which gives an optically clear or empty looking appearance giving rise to the name Orphan

Annie eye or ground-glass nuclei .Invaginations of cytoplasm may in cross-sections give the appearance of intranuclear inclusions ("pseudo-inclusions") or intranuclear grooves. (Fig-20) The diagnosis of papillary carcinoma made based upon these nuclear features even in the absence of papillary architecture.[32]

Psammoma bodies (concentrically calcified structures) are frequently present within the papillary core. (Fig-18)

Variants of papillary thyroid carcinoma

- Diffuse follicular variant
- Cribriform-morular variant
- Encapsulated variant
- Diffuse sclerosing variant
- Encapsulated follicular variant
- Follicular variant
- Macrofollicular variant
- Microcarcinoma variant :

  Definition: 1cm or less (WHO)

- Oncocytic Variant
- Tall Cell Variant
- Clear Cell Variant
- Solid variant of papillary carcinoma
- Columnar cell variant
- Nodularfasciitis like stroma variant

PROGNOSTIC FACTORS IN PAPILLARY CARCINOMA

Age: Mortality low in patients under the age of 40 years

Sex: Male sex associated with worse prognosis

Size: 1-1.5 cm excellent prognosis, >4cm poor prognosis.

Stage: Extra thyroidal extension-poor prognosis.

Tumor encapsulation confers a favourable prognosis.

Histological variants: Tall cell, Diffuse follicular, Diffuse sclerosing, Solid variants, Cribriform-morular variant -more aggressive.

Anaplastic (Undifferentiated) Carcinoma

Anaplastic carcinomas are undifferentiated neoplasm of the thyroid follicular epithelium accounting for less than 5% of thyroid tumors. Manifests in older age than those with other types of thyroid cancer. The mean age of presentation is 65 years.

Cytology : (Fig-21)

- Highly cellular with bizarre large malignant cells showing epithelial or spindle sarcomatoid type.
- Prominent nuclear pleomorphism,multinucleation and mitotic figures
- Background shows necrotic cell fragments and debris

Gross: cut section shows large bulky ,soft, fleshy and lobulated mass with areas of necrosis, hemorrhage and cystic degeneration.

Microscopically these tumors composed of highly anaplastic cells with variable morphology including: (1) large pleomorphic cells including occasional osteoclast-like multinucleate giant cells (2) spindle cells showing sarcomatous appearance (Fig-22,23) (3) mixed spindle and giant cells. Foci of papillary or follicular differentiation may be present in some tumors suggesting an origin from a better differentiated carcinoma.

Medullary carcinoma of thyroid gland

Thyroid Medullary carcinomas are neuroendocrine neoplasms and derived from C cells of thyroid or parafollicular cells.It accounts for 5% of thyroid neoplasms.

Cytological Criteria for diagnosis

- Cellular smears with dispersed cells, some clustering may be seen .
- Variable cell pattern showing plasmacytoid, spindle and small cells
- Moderate anisokaryosis, occasional scattered very large nuclei with bi and multinucleate forms
- Uniform stippled nuclear chromatin
- Amorphous pink/violet background (amyloid)

Grossly, sporadic medullary thyroid carcinomas present as a solitary nodule. In contrast, bilaterality and multicentricity are common in familial cases. Larger lesions often contain areas of necrosis and hemorrhage and may extend through the capsule of the thyroid. The tumor tissue is firm, pale gray to tan and infiltrative. There may be foci of hemorrhage and necrosis in the larger lesions.

Microscopically medullary carcinomas are composed of spindle shaped to polygonal cells which may form trabeculae ,nests and even follicles. (Fig-24)

Small more anaplastic cells are present in some tumors and may be the predominant cell type. Acellular amyloid deposits are present in the adjacent stroma in many cases that can be demonstrated by congo –red stain (Fig-25).

Variants of medullary thyroid carcinoma

Medullary microcarcinoma

Paraganglioma-like variant

Small cell variant

Tubular (follicular) variant

FOLLICULAR CARCINOMA

Follicular carcinomas account for 5% to 15% of primary thyroid cancers. They are more common in women (3 : 1) and manifests at an older age than papillary carcinomas .The Peak incidence is found between 40 - 60 years of age.

Follicular carcinomas presents as single nodule that may be well circumscribed or widely infiltrative.They are gray tan to pink on cut section. Degenerative changes such as central fibrosis and foci of calcification are sometimes present.

Microscopically most follicular carcinomas composed of fairly uniform cells arranged in small follicles and containing colloid. In some cases follicular differentiation may be minimal and there may be sheets and nests of cells without colloid. Whatever the pattern ,the nuclei lack the features of typical of papillary carcinoma.

Hurthle cell or oncocytic variant of follicular carcinoma Tumor cells with abundant eosinophilic granular cytoplasm .

Minimally invasive follicular carcinoma. This variant requires extensive histologic sampling from the tumor-capsule-thyroid interface to exclude capsular or vascular invasion.

Widely invasive follicular carcinomas. Infiltrate the thyroid and extra-thyroidal soft tissues.

Recommendation of Rosai in classifying definitive follicular carcinomas as follows:

-Encapsulated

- With capsular invasion only

- With limited (less than 4 vessels) vascular invasion

-With extensive (more than 4 vessels) vascular invasion

-Widely invasive

Touch Impression Cytology (TIC)

Intraoperative cytological diagnosis is required for the optimal extent of surgery and to know the nature of lesion whether the lesion is malignant or not. Both Frozen Section (FS) and Touch Impression Cytology (TIC) serve this purpose well. Both provide accurate results in minutes while the patient is under anesthesia. Surgeon then modifies his surgical plan based on the intraoperative consultation with pathologist. While FrozenSection tissue architecture closely approximates permanent histology sections, enabling a degree of comfort, Touch Impression Cytology provides better, crisp cellular details and even some tissue architecture with fewer artifacts.

Immunohistochemistry

Role of Ki-67 as a proliferative marker in lesions of thyroid

Ki-67 is an IgG1 type murine monoclonal antibody raised against a crude nuclear fraction of Hodgkin's disease-derived cell line L-428. The ki 67was named after its place of production in West Germany at Kiel. The clone producing the

Ki67antibody was grown in the sixty seventh well of tissue culture plate. Ki-67 is a novel proliferative marker that can be readily detected by immunohistochemistry. Gerdes et al. have shown that all stages of the cell cycle will express Ki-67 except G-0 because resting cells entering from G-0 lack Ki-67 in early part of G1. Saad et al. determined the proliferative rate of normal human thyroid cells in different age groups using Ki-67 and found Ki-67 Labeling Index to be 7.4 ± 6.10% in 25 fetal thyroids, 0.23 ± 0.15% in 55 childhood thyroids and 0.08 ± 0.04% in 37 adults at autopsy.

Ki- 67 marker study may be helpful in distinguish undifferentiated areas from differentiated areas in a mixed type of thyroid cancer.

Ki-67 labeling index (LI) show progressive increase from multinodular goiter to to malignant neoplastic lesions.(Fig-26,27,28,29).

MATERIAL AND METHODS

In the two and half year study period from January 2010 to May 2012, 20908 specimens were received in the Department of pathology, Madurai Medical College, Madurai for histopathological examination from Government Rajaji Hospital, Madurai. Among these 1123 cases were from head and neck lesions and 626 cases from thyroid gland lesions.

During the study period 1026 Fine Needle Aspiration Cytology from thyroid were received for cytological examination. Out of these 117 cases had post surgical followup. A range of cytological diagnosis was offered on all satisfactory smears. A correlative cytological and histopathological study was done. Imprint cytology was done for 51 cases and a final correlative study was done between Fine Needle Aspiration Cytology , Imprint cytology and Histopathology .

1123 specimens were from various sites in head and neck region such as Scalp, periorbital region, ear, nose, cheek , lip, tonsil , tongue, thyroid, salivary glands and lymph nodes. Out of these 117 specimens were from thyroid and these cases were taken for this study .Out of these 117 cases imprint cytology was done for 51 cases .

The detailed clinical history of these 117 patients including the duration of swelling, pain, fever, loss of weight, loss of appetite and cough with

expectoration etc. were obtained and tabulated in the proforma and which was enclosed in annexure I.

Fine Needle Aspiration Cytology was done for 117 thyroid cases. The aspiration syringes used were 10-20 ml and the needle size between 22-23 gauges .The cytological materials obtained were fixed in ninety five(95)% ethyl alcohol then stained with haemotoxylin and eosin .The reports were recorded in master chart-A.

Touch Imprint cytology was done for 51 cases on freshly cut surface of the specimen by gently pressing the glass slide. Then the slides were immediately wet fixed in ninety five percent ethyl alcohol for five to six seconds. Then the smears were stained with haematoxylin and eosin. Results were recorded in master chart-B.

The specimens of lobectomy, hemi thyroidectomy, near total thyroidectomy and total thyroidectomy with modified neck dissection were received for histopathological examination.

The specimens were fixed in 10% formalin for 24 – 48 hours .Then detailed gross examination including weight, measurement, shape , colour and consistency were noted. They were cut into parallel and longitudinal slices including the capsular invading areas. The additional features such as hemorrhage ,

cystic degeneration, calcification, necrosis and distance from the line of resection were noted. The representative sections were taken from the lesions as shown in the table number.1

Table 1

Thyroid lesion	**Number of sections**[41]
For diffuse or inflammatory lesions	Three sections from each lobe and one from isthmus
Solitary encapsulated nodule	Sections from the entire circumference including tumor capsule and adjacent thyroid tissue
Multi nodular thyroid gland	One section from each nodule including adjacent thyroid tissue
Papillary carcinoma	Entire thyroid gland was blocked
Grossly invasive carcinoma (other than papillary carcinoma)	Three sections from tumor and three sections from non neoplastic gland and one from line of resection

The tissue slices were processed in various grades of alcohol and xylol and subsequently embedded in paraffin wax. Paraffin sections of 4 μm thickness were subjected to haemotoxylin and eosin staining .(H and E staining technique is enclosed in annexure-III).The histopathololological study was done for 117 cases .

A correlative study between Fine Needle Aspiration Cytology and histopathology was done for these 117 cases and recorded in masterchart-A.

FNAC, Touch imprint cytology, Histopathological reports of 51 cases were recorded seperately in master chart- B and final correlative study was done.

Immunohistochemistry ki67 marker study was done for some selective cases and reports were recorded. The procedure of Immunohistochemistry ki67 marker study was enclosed in annexure-III.

Statistical Tools

Data analysis was done with the help of computer using Epidemiological Information Package (EPI 2002).

The Statistical datas are calculated by using the following formulae

$$\text{Sensitivity} = \frac{\text{True positive}}{\text{True positive + False negative}} \times 100$$

$$\text{Specificity} = \frac{\text{True negative}}{\text{False positive + True negative}} \times 100$$

$$\text{Positive predictive value} = \frac{\text{True positive}}{\text{True positive + False positive}} \times 100$$

$$\text{Negative predictive value} = \frac{\text{True negative}}{\text{True negative + False negative}} \times 100$$

$$\text{Accuracy} = \frac{\text{True positive + True negative}}{N} \times 100$$

OBSERVATION AND RESULTS

In the two and half year study period from January 2010 to May 2012, 626 thyroid specimens were received in the Department of pathology, Madurai Medical College, Madurai for histopathological examination from Government Rajaji Hospital, Madurai. The average incidence of thyroid lesions in this hospital was 2.99%.

117 cases of Fine Needle Aspiration Cytology from thyroid had post surgical followup. A range of cytological diagnosis was offered on all satisfactory smears. A correlative cytological and histopathological study was done. Imprint cytology was done for 51 cases and a final correlative study was done between Fine Needle Aspiration Cytology , Imprint cytology and Histopathology.

AGE INCIDENCE:

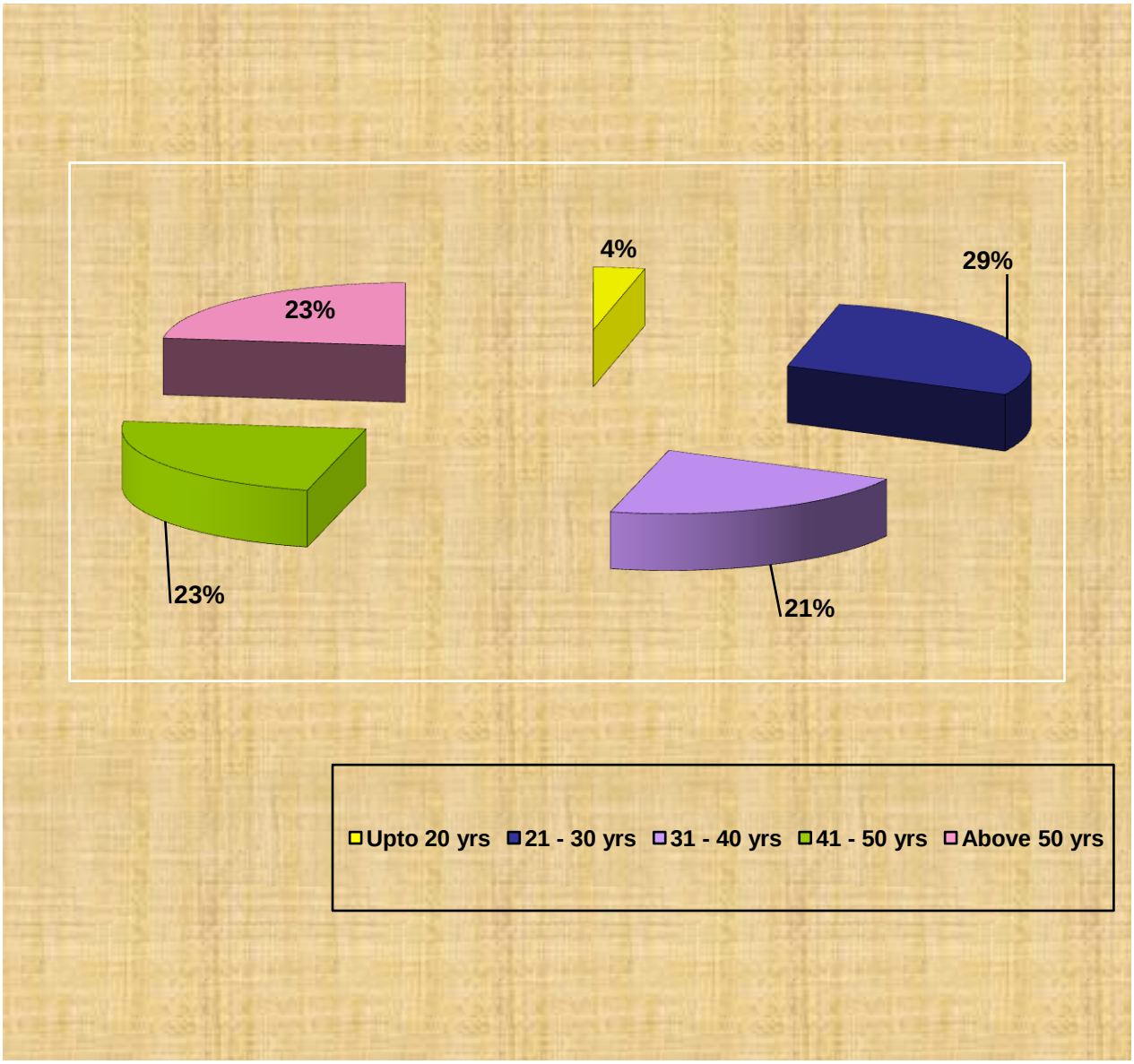
The age incidence of various thyroid lesions were categorized and tabulated in table number -2 and chart number-1.

Table- 2 : Age distribution

Age group (in years)	Cases	
	No	%
Upto 20 years	4	3.4
21-30 years	34	29.0
31-40 years	25	21.4
41-50 years	27	23.1
Above 50 years	27	23.1
Total	117	100
Range	15-70 years	
Mean	39.8 years	
SD	13.3 years	

In the present study, the youngest patient was 15 years old and oldest patient was 70 years old.

Chart 1 -Age distribution



Age group wise distribution of thyroid lesions

The age group wise distribution of thyroid lesions were tabulated in table number- 3.

Table- 3 Age group wise distribution of thyroid lesions

AGE GROUP	MNG	HASH THY	GRA. THY	FOLL ADE	PAP.CA	MEDU. CA	ANA.CA
11-20	2			2			
21-30	12	7		9	6		
31-40	12	3		8	1	1	
41-50	15	3		4	4	1	
51-60	11	3		2	5		
61-70	2	2	1				1

Non neoplastic and neoplastic (benign and malignant) lesions were found to be more prevalent in the age group of 21-30 years

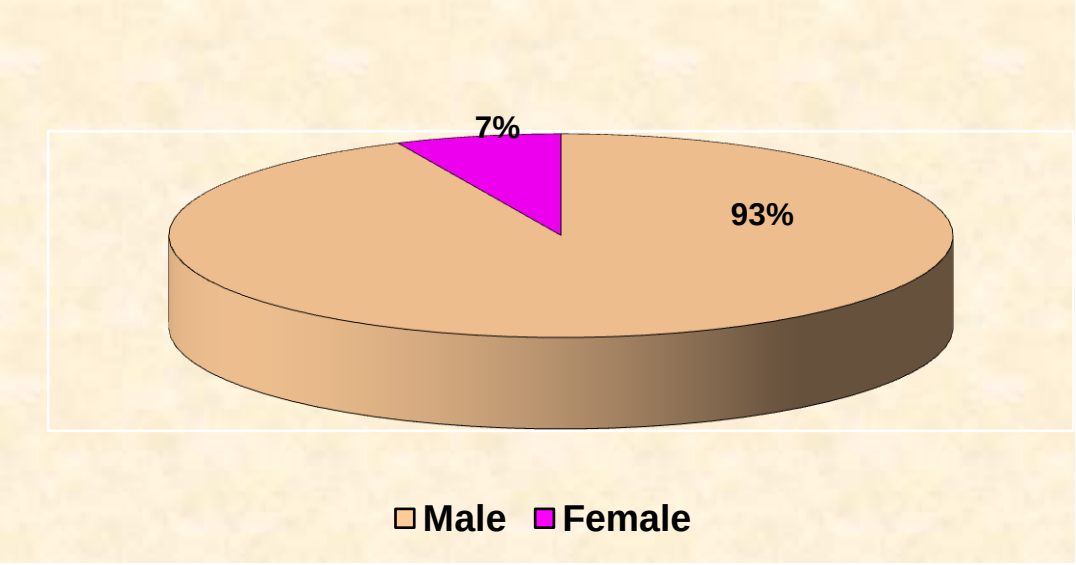
SEX INCIDENCE:

The sex incidence of thyroid lesions were tabulated in table number -4 and chart number -2.

Table -4 : Sex incidence

Sex	Cases	
	No	%
Male	8	6.8
Female	109	93.2
Total	117	100

Chart- 2



Among total 117 cases, 109 patients were female (93.16%) and 8 patients were male (6.84%). There is a female preponderance with a Female to Male ratio of 13.6:1. The age of female patients were ranging from 15-70 years and male patients ranging from 30-69 years

Sex distribution of thyroid lesions

Sex distribution of thyroid lesions tabulated in table number- 5

Table - 5 . -Sex distribution of thyroid lesions

HPE diagnosis	**Female**	**Male**
Non neoplastic lesions	69	4
Benign neoplastic lesions	24	1
Malignant neoplastic lesions	16	3
Total	109	8

Non neoplastic lesions

Among 73 non neoplastic lesions , 69 cases were female and the remaining 4 cases were male

Table 6- Sex Distribution Of Non Neoplastic Thyroid Lesions

HPE diagnosis	**Female**	**Male**
Nodular goiter	50	4
Hashimatothyroiditis	18	
Granulomatous thyroidits	1	
Total	69	4

Benign Neoplastic Lesions

Among 25 benign neoplastic lesions 24 cases were female and one case was male

Malignant Neoplastic Lesions

Among 19 Malignant neoplastic lesions 16 cases were female and 3 cases were male .

Table- 7. Sex distribution Malignant neoplastic thyroid lesions

HPE diagnosis	Female	Male
Papillary carcinoma	14	2
Medullary carcinoma	1	1
Anaplastic carcinoma	1	

CYTOLOGICAL EVALUATION OF THYROID LESIONS:

The cytological diagnosis was offered for 117 cases which had post surgical follow up and shown in table number -8 and chart number- 3.

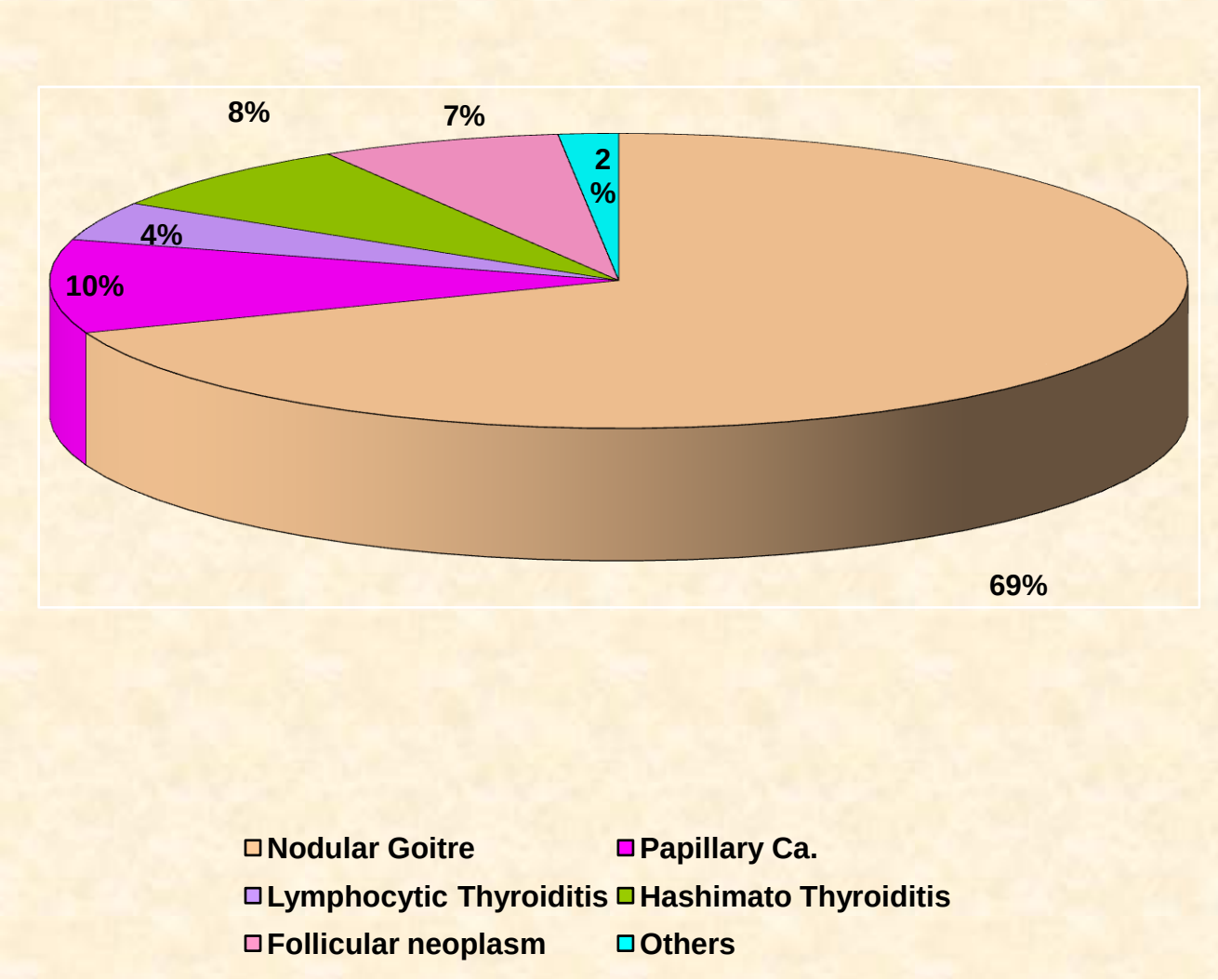
Table -8 : FNAC Diagnosis

FNAC Diagnosis	Cases	
	No	**%**
Nodular goiter	81	69.23
Papillary Carcinoma	12	10.3
Lymphocytic Thyroditis	5	4.3
Hashimato Thyroditis	9	7.7
Follicular neoplasm	8	6.8
Anaplastic carcinoma	1	0.85
Granulomatous thyroiditis	1	0.85
Total	117	100

Out of these 117 FNAC studies, 81cases were reported as nodular goiter , 12 cases as papillary carcinoma, 9 cases as hashimato thyroiditis, 5 cases as

lymphocytic thyroiditis, 8 cases as follicular neoplasm, one case as Granulomatous thyroiditis and another one case as anaplastic carcinoma .

Chart-3. Cytological distribution Of Thyroid Lesions



Imprintcytology diagnosis

Imprintcytological diagnosis was offered for 51 cases and shown in table number -9 and chart number -4.

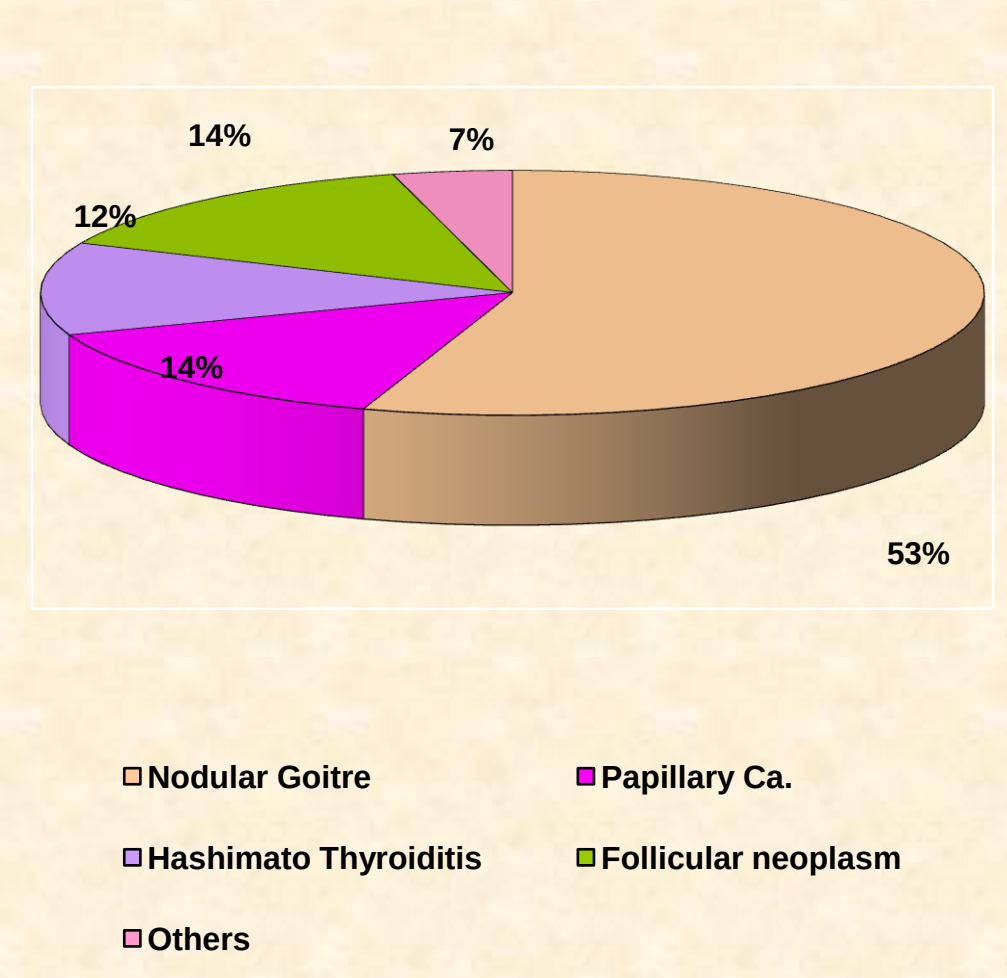
Table 9: Imprint cytology Diagnosis

Imprint cytology diagnosis	Number of cases
Nodular goiter	27
Papillary carcinoma	7
Hashimato thyroiditis	6
Follicular neoplasm	7
Lymphocytic thyroiditis	2
Anaplastic carcinoma	1
Granulomatous thyroiditis	1
TOTAL	51

Out of these 51 thyroid imprint cytology studies 27 cases were reported as nodular goiter , 7 cases as papillary carcinoma, 6 cases as Hashimato thyroiditis, 2cases as lymphocytic thyroiditis, 7 cases as follicular neoplasm, one case as Granulomatous thyroiditis and another case as Anaplastic carcinoma .

Among them nodular goiter was the commonest lesion found in this study.

Chart-4 Imprint Cytological distribution Of Thyroid Lesions



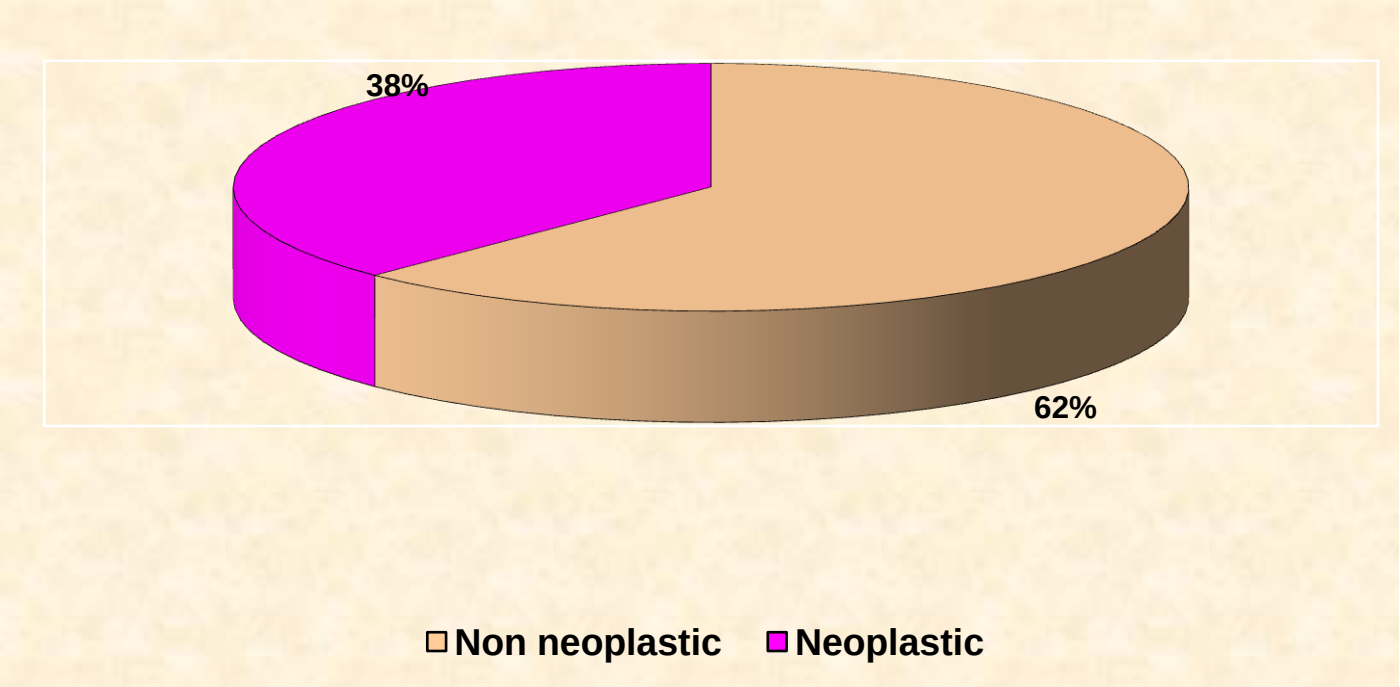
HISTOPATHOLOGICAL DIAGNOSIS;

The histopathological diagnosis was offered for 117 cases of thyroid lesions which had preoperative cytological diagnosis. The distribution of various non neoplastic and neoplastic thyroid lesions tabulated in table number -10 and chart number -5. Out of these 117 lesions 73 cases were non neoplastic lesions and 44 were neoplastic lesions.

Table -10. histopathological diagnosis;

LESION	Number of cases	Percentage
NONNEOPLASTIC LESIONS	73	62
NEOPLASTIC LESIONS	44	38

Chart-5 Histopathological Distribution Of Thyroid Lesions



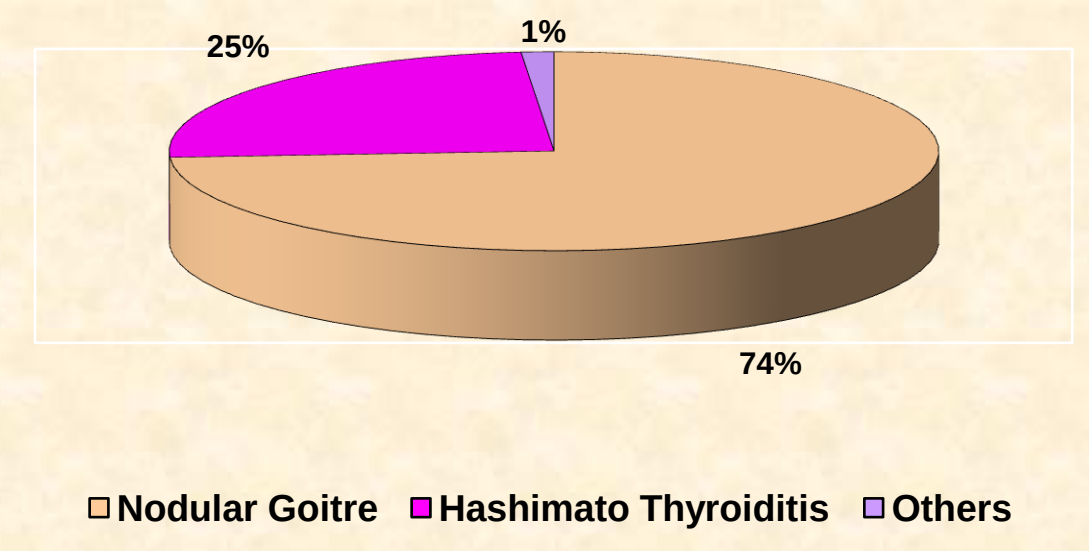
NONNEOPLASTIC LESIONS

Among the 73 non neoplastic lesions 54cases were reported as nodular goiter ,18 cases as hashimatothyroiditis and 1 case as Granulomatous thyroidits and shown in table number -11 and chart number -6.

Table 11- Nonneoplastic Lesions

Diagnosis	Number of cases
Nodular goiter	54
Hashimotothyroiditis	18
Granulomatous thyroidits	1
Total	73

Chart 6- Distribution Of Non Neoplastic Thyroid Lesions



NEOPLASTIC LESIONS

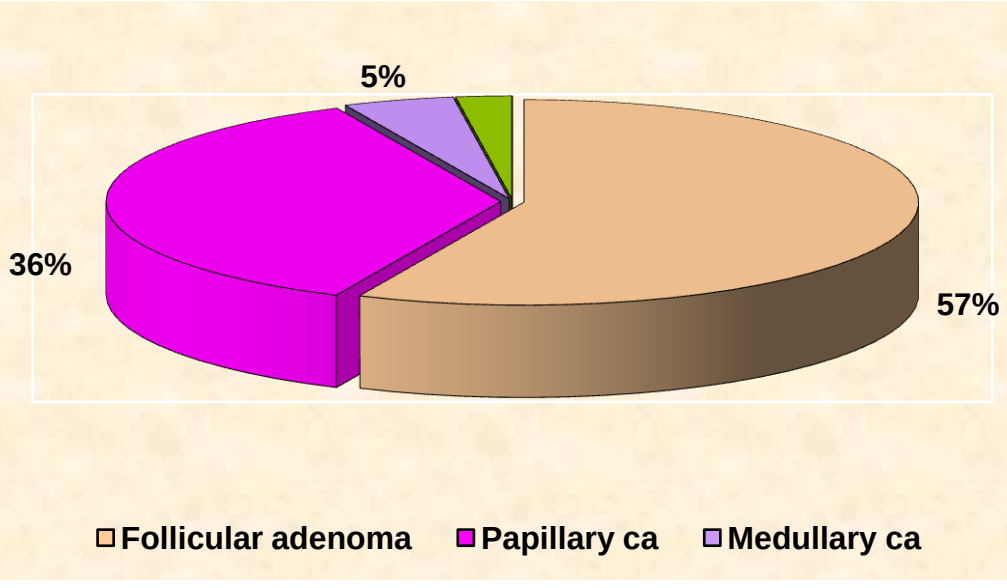
Out of the 44 neoplastic lesions 25 cases were reported as benign neoplastic lesions and 19 as malignant neoplastic lesions and shown in table number -12 and chart number - 7.

Table-12. Neoplastic Thyroid Lesions

Diagnosis	**Number of cases**
BENIGN NEOPLASTIC LESIONS	
Follicularadenoma	25
MALIGNANT NEOPLASTIC LESIONS	
Papillary carcinoma	16
Medullary carcinoma	2
Anaplastic carcinoma	1
Total	44

Among the 19 malignant neoplastic lesions 16 cases were reported as papillary carcinoma , 2 cases as medullary carcinoma thyroid and 1 case as anaplastic carcinoma thyroid .

Chart 7- Distribution Of Neoplastic Thyroid Lesions



CORRELATIVE STUDY BETWEEN FINE NEEDLE ASPIRATION CYTOLOGY(FNAC) AND HISTOPATHOLOGY(MASTER CHART –A)

A Correlative Study Between Fine Needle Aspiration Cytology And Histopathology was done for 117 cases and tabulated in table number -13.

Table-13 Correlation between FNAC AND HPE

FNAC AND HPE CORRELATION	**NUMBER OF CASES**	**PERCENTAGE**
CORRELATED	65	55.5%
NOT CORRELATED	52	44.5%

Among 117cases , 65 Fine Needle Aspiration cytology reports (55.5%) were well correlated with histopathological diagnosis. The remaining 52 Fine Needle Aspiration cytology reports(44.5%) were not correlated with histopathological diagnosis and tabulated in table -14. Among them 36 cases were reported as Nodular goiter, 5 cases as Lymphocytic thyroiditis, 4 cases as Hashimotothyroiditis , 5 cases as Follicular neoplasm and 2 cases as papillary carcinoma .

Table -14.Correlation Between FNAC And Histopathology

FNAC DIAGNOSIS	NO.OF CASES	HPE DIAGNOSIS						
		MNG	HAS THY	FOLL ADE	PAP CA	MEDU CA	ANA CA	Gran.thy
Nodular goiter	81	45	10	20	5	1		
Papillary carcinoma	12	1	1		10			
Hashimotothyroiditis	9	2	5		1	1		
Lymphocytic thyroiditis	5	1	2	2				
Follicular neoplasm	8	5		3				
Anaplasticcarcinoma	1						1	
Gran. thyroiditis								1

In the present study 81 cases of Nodular goiter on Fine Needle Aspiration cytology were found to be Nodular goiter in 45 cases, Follicular adenoma in 20 cases, Hashimato thyroiditis in 10 cases ,Papillary carcinoma in 5 cases and Medullary carcinoma in one case on subsequent histopathological examination .

5 cases of Lymphocytic thyroiditis on Fine Needle Aspiration cytology were found to be Nodular goiter in 1 case, Follicular adenoma in 2 cases and Hashimato thyroiditis in 2 cases on subsequent histopathological examination.

8 cases of Follicular neoplasm on Fine Needle Aspiration cytology were found to be Nodular goiter in 5 cases and Follicular adenoma in 3 cases on subsequent histopathological examination.

9 cases of Hashimato thyroiditis on Fine Needle Aspiration cytology were found to be Hashimato thyroiditis in 5 cases, Nodular goiter in 2 cases, Medullary carcinoma in one case and Papillary carcinoma in one case on subsequent histopathological examination.

12cases of Papillary carcinoma on Fine Needle Aspiration cytology were found to be Papillary carcinoma in 10 cases, Hashimato thyroiditis in one case and Nodular goiter in one case on subsequent histopathological examination.

One case of Anaplastic carcinoma and another one case of Granulomatous thyroiditis on Fine Needle Aspiration cytology were confirmed by subsequent histopathological examination .

FINAL CORRELATION BETWEEN FINE NEEDLE ASPIRATION CYTOLOGY, IMPRINT CYTOLOGY AND HISTOPATHOLOGICAL DIAGNOSIS (MASTER CHART –B)

Final Correlative study was done by comparing the results of Fine Needle Aspiration cytology, imprint cytology with Histopathological reports of 51 cases.

Correlation Between Fine Needle Aspiration Cytology (FNAC)And Histopathology.

Out of 51 thyroid Fine Needle Aspiration cytology studies, 32cases were reported as nodular goiter, 6 cases as papillary carcinoma, 2 cases as Hashimotothyroiditis, 4cases as lymphocytic thyroiditis, 5 cases as follicular neoplasm, one case as Granulomatous thyroiditis and another one case as anaplastic carcinoma.

A correlation done between Fine Needle Aspiration cytology and histopathology showed the following results. 33 Fine Needle Aspiration cytology reports (64%) were correlated with histopathological diagnosis and tabulated in table -15, chart number- 8.

In the remaining 18 (36%) Fine Needle Aspiration cytology reports were not correlated with histopathological diagnosis. Among them 11 cases were reported as Nodular goiter, 4 cases as Lymphocytic thyroiditis and 3 cases as Follicular neoplasm.

Table-15. Correlation Between FNAC And Histopathology.

FNAC DIAGNOSIS		HISTOPATHOLOGICAL DIAGNOSIS					
	NO.OF CASES	MNG	HASH THY	GRA THY	FOLL ADE	PAP CA	ANA CA
Nodular goiter	32	21	3		5	3	
Lymphocytic thyroiditis	4	1	2		1		
Hashimatothyroiditis	2		2				
Granulomatous Thyroiditis	1			1			
Follicular neoplasm	5	3			2		
Papillary carcinoma	6					6	
Anaplastic carcinoma	1						1

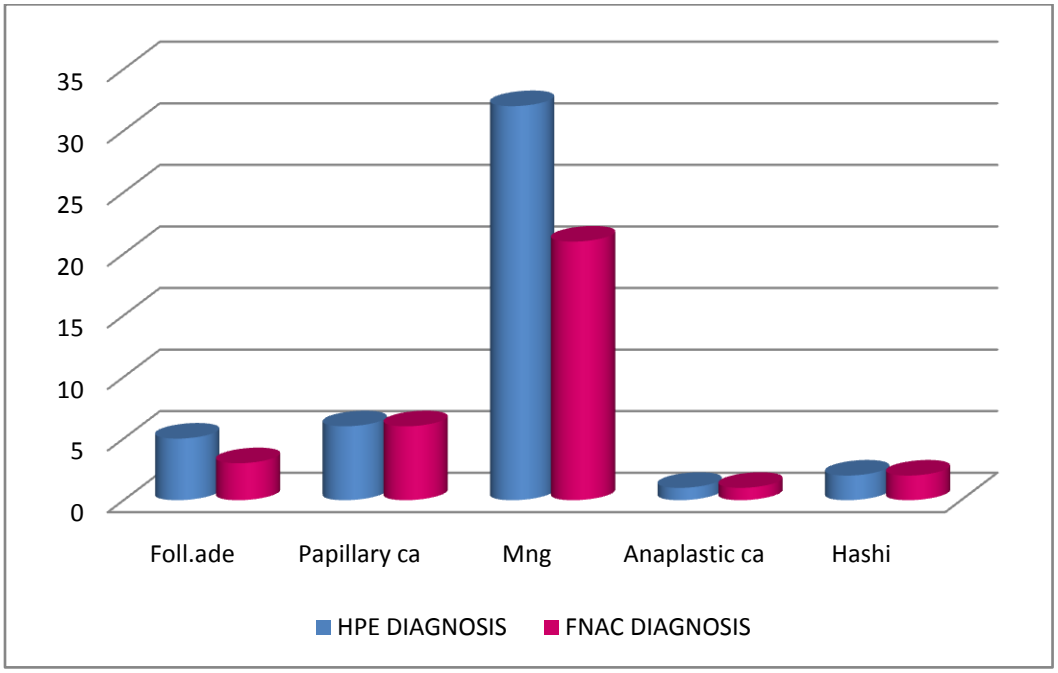
In this study 32 cases of Nodular goiter on Fine Needle Aspiration cytology were found to be Nodular goiter in 21 cases, Follicular adenoma in 5 cases, Hashimato thyroiditis in 3 cases and Papillary carcinoma in 3 cases on subsequent histopathological examination.

4 cases of Lymphocytic thyroiditis on Fine Needle Aspiration cytology were found to be Nodular goiter in 1 case, Follicular adenoma in 1 case and Hashimato thyroiditis in 2 cases on subsequent histopathological examination.

5 cases of Follicular neoplasm on Fine Needle Aspiration cytology were found to be Nodular goiter in 3 cases and Follicular adenoma in 2 cases on subsequent histopathological examination.

2 cases of Hashimato thyroiditis, 6 cases of Papillary carcinoma , one case of Granulomatous thyroiditis and another one case of Anaplastic carcinoma were subsequently confirmed on histopathology.

CHART-8 -Correlation between FNAC And HPE



Correlation Between Imprintcytology And Histopathology

A correlative study was done between Touch imprint cytology and histopathology showed the following results and tabulated in table number-16, chart number -9. Among them 44(86%) Touch imprint cytology reports were correlated with histopathological diagnosis.

Table-16 Correlation Between Touch imprint cytology And Histopathology

TIC DIAGNOSIS	**NO.OF CASES**	**HISTOPATHOLOGICAL DIAGNOSIS**					
		MNG	HASH THY	GRA THY	F.A	PAP CA	ANA CA
Nodular goiter	27	23			2	2	
Lymphocytic thyroiditis	2	1	1				
Hashimatothyroiditis	6		6				
Granulomatous Thyroiditis	1			1			
Follicular neoplasm	7	1			6		
Papillary carcinoma	7					7	
Anaplastic ca.	1						1

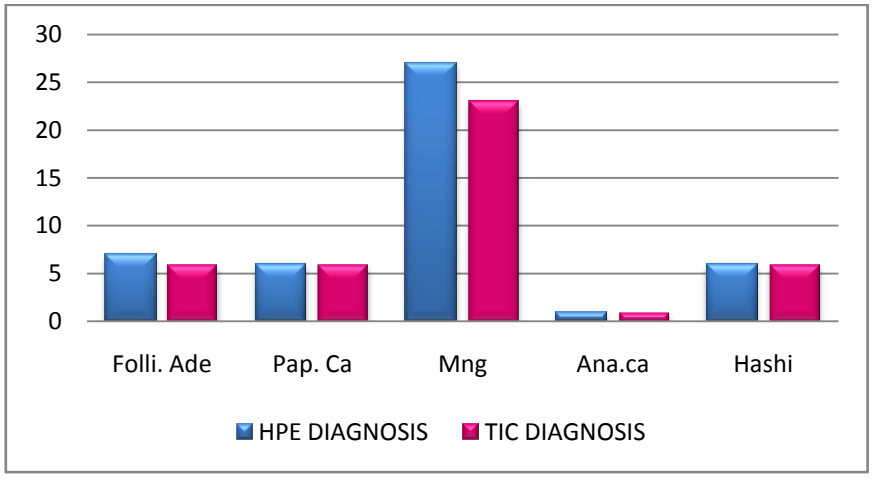
In the present study 27 cases of Nodular goiter on Touch imprint Cytology were found to be Nodular goiter in 23 cases, Follicular adenoma in 2 cases and Papillary carcinoma in 2 cases.

2 cases of Lymphocytic thyroiditis on Touch imprint Cytology were found to be Nodular goiter in 1 case and Hashimotothyroiditis in one case on subsequent histopathological examination.

7 cases of Follicular neoplasm on Touch imprint Cytology were found to be Follicular adenoma in 6 cases and Nodular goiter in 1 case on subsequent histopathological examination.

6 cases of Hashimotothyroiditis, 6 cases of Papillary carcinoma,one case of Granulomatous Thyroiditis and another one case of Anaplastic carcinoma on Touch imprint Cytology were subsequently confirmed by histopathology.

CHART-9 Correlation Between TIC And HPE



Immunohistochemistry

Ki-67 Immunohistochemical staining was done for six different types of thyroid lesions such as Granulomatous thyroiditis , Hashimotothyroiditis, Nodular goiter, Follicular adenoma ,Papillary carcinoma and Anaplastic carcinoma .

An area with the maximum proliferation was chosen to evaluate the labeling index. Labeling index was expressed as percentage of positively stained cells (Brown granular nuclear reactivity) per 100 follicular epithelial cells after counting at least 1000 cells in each case. The staining pattern in various thyroid lesions tabulated in table number -17

Table-17.Ki-67 staining pattern in various thyroid lesions

SNO	HPE DIAGNOSIS	Ki-67 staining
1	Granulomatous thyroiditis	Negative
2	Hashimato thyroiditis	Positive in germinal centre of follicles.
3	Multi Nodular goiter	Very few cells positive
4	Follicular adenoma	Positive
5	Papillary carcinoma	Positive(1 to 2%)
6	Anaplastic carcinoma	Strong positivity

In the present study, the mean values of Ki-67 Labeling index was increasing progressively from multi nodular goiter to Anaplastic carcinoma.

DISCUSSION

Fine Needle Aspiration Cytology of thyroid has become the most common and well established preoperative diagnostic procedure used in the management of patients with thyroid lesions. It is relatively cost effective procedure that provide diagnosis rapidly.

Incidence of thyroid lesions :

We received 117 gross specimens for histopathological examination following initial cytological evaluation by fine needle aspiration cytology. In present study non neoplastic lesions accounts for 73 cases and neoplastic lesions accounts for 44 cases. The ratio between non neoplastic and neoplastic thyroid lesions in this study is 1.66:1.

Incidence of nonneoplastic and neoplastic thyroid lesions in this study is tabulated in table number -18

Table – 18 Incidence of thyroid lesions

S.NO	Series	Non Neoplastic	Neoplastic	Ratio
1.	Pepper G.M [35]	84	18	4.66:1
2.	Dorairajan N [7]	78	20	3.90:1
3.	Sarda AK [45]	87	59	8.25:1
4.	Naggada HA [33]	51	18	2.83:1
5.	Gupta C [17]	470	30	15.66:1
6.	Kaur K [23]	32	15	2.13:1
7.	Due k SD	145	61	2.37:1
8.	Hurtado – LopezLM [19]	80	50	1.60:1
9.	Talepoor M [53]	325	75	4.33:1
10.	Prakash H.M [37]	138	24	5.75:1
11.	Present Study	73	44	1.66:1

Incidence of Malignancy :

In the present study, the incidence of malignant neoplastic thyroid lesions accounts for 16.24% which well correlates with studies conducted by various research workers as well as in literature and tabulated in the Table number -19.

Table19 – Incidence of Malignancy

Sl. No.	Study	Percentage
1.	Mary Jo Welker et al [28]	5-10%
2.	Kaur et al [23]	18%
3.	YS Chenug et al [56]	5-10%
4.	Munsad B et al [31]	4.16%
5.	Alexander Kessler [2]	10%
6.	Suresh et al [51]	10%
7.	GG Swamy et al [13]	18.33%
8.	Prakash H.M [37]	14.81%
9.	present study	16.24%

.

AGE INCIDENCE:

In the present study the mean age of presentation is 39.8 years which correlates with the literature of various authors and tabulated in table number -20.

Table 20– Comparative Incidence of Mean age in Different Studies

Sl.No	Studies	Mean Age
1.	Quari F et al [39]	36.17 years
2.	Wasser MH et al [54]	44 years
3.	Suresh Kumar et al [51]	38.5 years
4.	Talepoor M et al [53]	38.6 years
5.	Das DK et al [6]	35 years
6.	Prakash HM et al [37]	35.67 years
7.	Manoj Gupta et al [26]	38.7 years
8.	Martin et al [27]	39.5years
9.	Present Study	39.8 years

SEX INCIDENCE :In this study , majority of them were females. Female to male ratio of 13.6 : 1 and correlates with observation of other various authors as indicated in table number-21.

Table – 21

Comparative sex incidence of thyroid lesions in different studies

Sl. No.	Studies	Sex Incidence (female : male) ratio
1.	Das DK [6]	5.39 : 1
2.	Manoj Gupta [26]	11;1
3.	Martin etal [27]	6.4:1
4.	Prakash H.M [37]	7.1 : 1
5.	Dorairajan N[7]	9:1
6.	Present Study	13.6 : 1

FINAL CORRELATIVE STUDY BETWEEN FINE NEEDLE ASPIRATION CYTOLOGY , TOUCH IMPRINT CYTOLOGY AND HISTOPATHOLOGY

In 2008 Handa u et al reported that Fine Needle Aspiration Cytology(FNAC) is routinely used preoperativily for the assessment of thyroid lesions and it cutsdown the number of patients subjected to thyroidectomy for benign diseases of the thyroid. Intraoperative cytological diagnosis is required for the optimal extent of surgery and to know either the lesion is malignant or not. Both Touch Imprint Cytology (TIC) and Frozen Section (FS) serve this purpose well. Both provide accurate results within minutes.

In the present study , specimens of lobectomy,hemi thyroidectomy, near total thyroidectomy and total thyroidectomy were received for histopathological examination which offers final and confirmatory postoperative diagnosis of the specimens.

Fine Needle Aspiration Cytology was done pre operatively for 1026 cases in our institution during the study period and imprint cytology was undertaken intraoperatively for 51 cases followed by histopathological examination postoperatively and final diagnosis was made . Since imprint cytology was available for only 51 cases a correlative study between FNAC, imprint cytology and histopathology was done for 51 cases excluding the other cases.

Correlation Between Fine Needle Aspiration Cytology and Histopathology

In the present study, non neoplastic lesions accounts for 39cases out of 51 cases and neoplastic lesions accounts for 12 cases out of 51 cases. Among them Fine Needle Aspiration Cytology and Histopathology reports correlated well in 33cases 64%. (24 cases in non neoplastic lesions and 9 cases in neoplastic lesions) .

Non neoplastic lesions:

In the present study among the non neoplastic lesions Nodular goiter was the most common lesion.

In this study 32 cases 0f Nodular goiter on Fine Needle Aspiration Cytology were well correlated with 21 cases in histopathology. Among the other non neoplastic lesions 2cases of Hashimato thyroiditis , 1case of Granulomatous Thyroiditis were well correlated with histopathology.

4cases of Lymphocytic thyroiditis on Fine Needle Aspiration Cytology showed varied diagnosis in histopathology.

Neoplastic lesions: In our study among the neoplastic lesions Papillary carcinoma was the most common lesion followed by follicular neoplasm.

6 cases of Papillary carcinoma , 1case of Anaplastic carcinoma on Fine Needle Aspiration Cytology were well correlated with subsequent histopathology.

Among the 5cases of follicular neoplasm 2 cases were well correlated with subsequent histopathology, the remaining 3cases showed different histopathological diagnosis.

Diagnostic problems were experienced in 11 cases of Nodulargoiter ,4 cases of Lymphocytic thyroiditis and 3cases of follicular neoplasm.

Among the preoperatively diagnosed 11 cases of Nodulargoiter 5 cases turned out to be Follicular adenoma, 3 cases as Hashimotothyroiditis and 3 cases as Papillary carcinoma in subsequent histopathology .The reasons are discussed below.

Problems are experienced in diagnosing the following thyroid lesions

1Nodulargoiter

2.Follicular neoplasm

3.Hyper plastic nodules

4.Cystic nodule/Cystic papillary carcinoma

5.Thyroiditis

The cytological picture of Nodulargoiter can overlap with follicular neoplasm at times. Smears from microfollicular area in nodular goiter may show picture similar to neoplasm.[8] Fine Needle Aspiration Cytology from hyperplastic

nodule will show marked cellularity of the smear which may mimic follicular neoplasm. Since this is a focal phenomenon, samples from other different areas should be taken to avoid misdiagnosis.

Cystic lesions of thyroid constitute a particular problem in Fine Needle Aspiration cytology .Cystic change and hemorrhage can occur not only in non neoplastic lesions but also in neoplastic lesions like follicular neoplasm and papillary carcinoma. If only cystic fluid containing macrophages but no epithelial cells are obtained neoplasm with cystic change cannot be ruled out [49]. In such cases fine needle aspiration biopsy should be done. Recurrent cysts greater than 3-4 cm is identified for surgery with ultra sound guidance [14]. To identify the neoplastic lesion with cystic change fine needle aspiration biopsy is advised along with ultra sound guidence to minimise the false negative diagnosis.

Cystic Papillay Carcinomas often contain abundant colloid. This can cause diagnostic problem especially if smears are poor in cells. In Nodulargoiter groups of large cells with irregulur nuclei of uncertain origin are frequently seen. They may be regenerating epithelial cells consistent with repair or may be histiocytes . These aggregates of histiocytes can mimic cells of papillay carcinomas in some cases due to similar nuclear features [34]. So we can reduce false negative results

by a close look at the nuclear features to make a correct diagnosis. According to HandaU et al marked cellularity or increased cellularity of the of the smear is another difficulty in thyroid fine needle aspiration cytology giving false negative diagnosis of carcinoma. [19]

Hurthlecell changes are commonly seen in Nodulargoiter. [52.] Prominent Hurthlecell change may be seen in some cases of Nodulargoiter but lymphoplasmacytic infiltrate will be sparse or absent.

Preoperatively diagnosed 4cases of Lymphocytic thyroiditis on Fine Needle Aspiration Cytology were subsequently reported as Nodulargoiter (1 case), Follicular adenoma (1 case) and Hashimoto thyroiditis(2 cases) on histopathology. In young patients and children 'florid lymphocytic'type of thyroiditis with scant epithelial cells are commonly seen [36]. The smears are dominated by a mixed population of lymphoid cells showing centroblasts, immunoblasts and dendritic reticulum cells . Follicular to Lymphoid cell ratios are often as high as 1:10. The epithelialcells are so inconspicuous and smears resemble reactive lymphoid hyperplasia mimicking lymphocytic thyroiditis.

The presence of hyperplastic follicular cells on FNAC samples from Hashimoto thyroiditis may mimic follicular neoplasm and result in a false interpretation. This can be avoided by adequate sampling of the thyroid. [29.]

3 cases of Follicular neoplasm in FNAC smear later reported as Nodulargoiter in histopathological examination. The differentiation between Follicular neoplasm and Nodulargoiter is the most common diagnostic problem in solitary nodules as cytological appearances may overlap [15] . A microfollicular focus in colloid nodule cytologically may mimic a microfollicular neoplasm, while smears from macrofollicular (colloid) adenoma resemble a dominant nodule in multinodular goiter.

Jaffar indicated that after excluding Papillary Carcinomas and Hurthle cell neoplasms presence of hemosiderin laden macrophages strongly favours the diagnosis of benign colloid nodule [22].

Concordance Between Fine needle aspiration cytology and Histopathology

In the present study concordance between Fine Needle Aspiration Cytology and Histopathology is 64%.

Table-22 Concordance Between FNAC and Histopathology

S.NO	Study	Concordance Between FNAC And Histopathology
1	Harach et al [18]	58.30%
2	Schnurer et al [46]	93.00%
3	Kunori et al [25]	98.00%
4	Das et al [6]	90.00%
5	Hag et al [10]	91.40%
6	Sandeep R Mathur et al [44]	97.01%
7	Present study	64%

Kunori et al viewed that diagnostic accuracy of goiters has considerably improved with the advent of Fine Needle Aspiration and ultrasound. GG Swamy et al in his institutional experience the diagnostic accuracy rate were improved from 88% to more than 98% after the induction of ultrasound in addition to Fine Needle Aspiration Cytology . So the concordance in this study can be improved by ultrasound guided Fine Needle Aspiration Cytology

Diagnostic accuracy of Fine Needle Aspiration Cytology:

In the present study we had True positive 7/51cases, True negative 41/51 cases,False negative 3/51 cases. sensitivity, specificity, diagnostic accuracy, positive predictive value (PPV) and negative predictive value (NPV) were calculated using the following formulae

$$\text{Sensitivity} = \frac{\text{True positive(TP)}}{\text{True positive(TN)} + \text{False negative(FN)}} \times 100$$

$$= \frac{7}{7+3} \times 100 = 70\%$$

$$\text{Specificity} = \frac{\text{True negative(TN)}}{\text{False positive(FP)} + \text{True negative(TN)}} \times 100$$

$$= \frac{41}{0+41} \times 100 = 100\%$$

$$\text{Positive predictive value} = \frac{\text{True positive(TP)}}{\text{True positive (TP)+ False positive(FP)}} \times 100$$

$$= \frac{7}{7+0} \times 100 = 100\%$$

$$\text{Negative predictive value} = \frac{\text{True negative (TN)}}{\text{True negative(TN) + False negative(FN)}} \times 100$$

$$== \frac{41}{41+3} \times 100 = 93\%$$

$$\text{Accuracy} = \frac{\text{True positive (TP) + True negative(TN)}}{N} \times 100$$

$$== \frac{7+41}{51} = 94\%$$

In the present study sensitivity ,specificity, positive predictive value(PPV), negative predictive value(NPV) ,diagnostic accuracy for malignant lesions of thyroid were70%,100%, 100%,93%,94% respectively. The following table (table -23) shows the comparison of specificity, sensitivity and diagnostic accuracy for malignant lesions of thyroid with various authors and is correlating well.

Table –23 Comparison of Specificity and Sensitivity for Thyroid Lesions

S. No.	Series	Total	Operated	Malignant	Sensitivity	Specificity
1.	Gupta C et al [17]	507	145	30	89.47	99.2
2	Kaur K et al [23]	50	50	5	83.3	100
3.	Mundasad B et al[31]	144	144	-	52	86.6
4.	Suresh K et al [51]	89			77	100
5.	Manoj Gupta et al[26]	75			80	86.6
6.	Bista M 2011 et al [4]	51	36	16	70	97.5
7.	Shirish C et al [48]	130	53	-	90	100
8.	Bhatta S et al[42]	90	20	7	85.7	92.3
9.	E.A. Sinna et al[9]	296			92.8	94.2
10	present Study	1026	117	19	70	100

Touch Impression Cytology (TIC)

Intraoperative pathologist consultation is required by surgeons for immediate important decisions regarding the nature of the lesion and to decide the optimal extent of surgery required. Both Touch Imprint Cytology (TIC) and Frozen Section (FS) serve this purpose well. Both provide accurate results with in minutes while the patient is under anesthesia. Operating Surgeon then modifies his surgical decision based on the intraoperative consultation with Pathologist. Touch Imprint Cytology provides better and crisp cellular details and even some tissue architecture.

Non neoplastic lesions in Touch Impression Cytology :

In thepresent study among the non neoplastic lesions Nodulargoiter was the most common lesion.

In this study 27 cases 0f Nodular goiter on Touch Impression Cytology were well correlated with 23 cases in histopathology. Among the other non neoplastic lesions 6 cases of Hashimatothyroiditis and 1 case of Granulomatous Thyroiditis were well correlated with histopathology.

2cases of Lymphocytic thyroiditis on Touch Impression Cytology showed the diagnosis of Hashimatothyroiditis and Nodulargoiter by subsequent histopathology.

Neoplastic lesions: In the present study among the neoplastic lesions papillary carcinoma and follicular neoplasm were the most common lesions.

7 cases of Papillary carcinoma , 1case of Anaplastic carcinoma on Touch Impression Cytology were well correlated with subsequent histopathology.

Among the 7 cases of follicular neoplasm 6 cases were well correlated with subsequent Histopathology. The remaining one case turned as Nodulargoiter in histopathological examination .

In the present study we had problem in diagnosing 4 cases of Nodulargoiter, 2 cases of Lymphocytic thyroiditis and a case of follicular neoplasm.

Concordance between Touch Impression Cytology and Histopathology is 86.27%. Concordance between Fine Needle Aspiration Cytology and Histopathology is 64%.

Diagnostic Accuracy of Touch Impression Cytology

In the present study True positive 6/51 cases, True negative 43/51 cases and False negative 2/51cases. Sensitivity, specificity, accuracy, positive predictive value (PPV) and negative predictive value (NPV) were calculated using the following formulae

Sensitivity = True positive(TP) x 100
True positive (TP)+ False negative(FN)

= 6 x 100 =75%
6+2

Specificity = True negative(TN) x 100
False positive(FP) + True negative(TN)

= 43 x 100 =100%
0+43

Positive predictive value = True positive(TP) x 100
True positive(TP) + False positive(FP)

= 6 x 100 =100%
6+0

Negative predictive value= True negative (TN) x 100
True negative(TN) + False negative(FN)

== 43 x 100 =95.5%
43+2

Accuracy = True positive(TP) + True negative(TN) x 100
N

== 6+43 =96%
51

In the present study, sensitivity ,specificity, positive predictive value(PPV), negative predictive value(NPV) and diagnostic accuracy for malignant lesions of thyroid were 75%, 100%, 100%, 95.5%, 96% respectivly. The following table (Table-24) shows the comparison of sensitivity, specificity, and accuracy of Touch Impression Cytology on malignant lesions of thyroid with various authors and is correlating well.

Table-24 –Comparison of Specificity and Sensitivity for Thyroid Lesions

S.NO	**study**	**Sensitivity**	**Specificity**	**Diagnostic Accuracy**
1	Issam et al[20]	85%	100%	71.1
2	Ahmareen Khalidet al[2]	94.9%,	96.8%.	98.4%
3	Sukumar Shaha[50]	81.25%,	66.66%,	82.59%,
4	Ferit Taneri[12]	83.3%	97.7%	95
5	Present study	75%	100%	96%

In the present study diagnostic accuracy rate, specificity by Imprint cytology is high with low sensitivity when compared to other studies. It showed good positive predictive value (PPV) and negative predictive value(NPV). Results of Frozen section by various authors shows high diagnostic accuracy rate but sensitivity was

relatively lower. It pointed out very high specificity and positive predictive value (100% in the present study), although negative predictive value (95.5% in the present study) was less. Therefore in this study, Touch imprint cytology (TIC) was found to be as good as frozen section in sensitivity and diagnostic accuracy .

Imprint cytology is a simple, rapid and sensitive technique for the diagnosis of thyroid lesions .In present study, we feel sufficiently high accuracy rate can be achieved by imprint study and this can be an useful guide in making decisions regarding the optimal extent of surgery required .

Touch Imprint Cytology alone may provide a correct diagnosis in vast majority of cases with minimal expense and without the need of sophisticated cryostat machine, thus making it quite suitable for many hospitals where cryostat machines are not available[1]. Touch imprint cytology has further advantage of being inexpensive, simple and quicker than frozen section.

Concordance Between Fine Needle Aspiration Cytology, Touch Impression Cytology and Histopathology

In the present study among the total 51 cases 32 cases (62%) showed Concordance Between Fine Needle Aspiration Cytology, Touch Impression Cytology and Histopathology .

Immunohistochemistry

Ki-67 Immunohistochemical staining done for six different types of thyroid lesions such as Granulomatous thyroiditis , Hashimotothyroiditis,Nodulargoitre, Follicular adenoma ,Papillary carcinoma and Anaplastic carcinoma.

In the present study the mean values of Ki-67 Labeling Index increased progressively from multinodular goiter to anaplastic carcinoma.

In 2010 Pujani M et al [38] reports that the mean values of Ki-67 Labeling Index increased progressively from multinodular goiter to follicular adenoma, papillary carcinoma and were the highest in undifferentiated carcinoma.

In 1998 Erickson et al. [11] observed the highest values for Ki-67 Labeling Index in anaplastic carcinoma which is followed by follicular and papillary carcinoma.

In 2002 Saiz et al [43]studied the immuno histochemical expression of Ki-67 and cyclin D1, E2F-1 in benign and malignant thyroid lesions .He found the highest expression of all the three markers in malignant tumors particularly in papillary carcinoma.

In 2008 Ziad et al. [57] studied immune expression of Ki-67 and thyroid transcription factor-1 (TTF-1) in a coexistent Anaplastic and Follicular carcinoma

and found a significantly higher Ki-67 Labeling Index in anaplastic areas in comparison with the follicular areas . Ki-67 and TTF-1 could provide useful information on the differentiation activities of thyroid tumor cells. It may be helpful to distinguish undifferentiated and well-differentiated areas in a mixed thyroid cancer

In the present study the mean values of Ki-67 Labeling Index is well correlating with other studies.

SUMMARY

- In the two and half year study period from January 2010 – May 2012 20908 specimens were received in the Department of pathology, Madurai medical college, Madurai. Among these 626 specimens were from thyroid lesions. Out of which preoperative Fine Needle Aspiration cytology was done for 117 cases. A correlative cytological and histopathological study was done. A peroperative touch imprint cytology was undertaken for 51 cases and a final correlative study was done with Fine Needle Aspiration cytology, touch imprint cytology and histopathology. The following conclusions are made and presented.
- The average incidence of thyroid lesions in this hospital is 2.99%.
- Most cases in this study are in the age group of second to third decade (29%)
- In the present study majority of them are females with female to male ratio of 13.6 : 1.
- Most common thyroid lesion in the present study is nodular goiter with the incidence of 46.15%.
- The most common benign neoplasm of thyroid is follicular adenoma with the incidence of 21.36%.

- The most common malignant thyroid neoplasm is papillary carcinoma with the incidence of 13.67%.
- In the present study sensitivity, specificity and diagnostic accuracy of Fine Needle Aspiration cytology(FNAC) in diagnosing malignant thyroid neoplasms are 70%,100 % and 94% respectively
- In the present study sensitivity, specificity and diagnostic accuracy of Touch Imprintcytology in diagnosing malignant thyroid neoplasms are 75%,100 %, and 96% respectively
- In the present study we had 7 True positive cases, 41True negative cases and 3 False negative cases in Fine Needle Aspiration Cytology . In his study concordance between Fine Needle Aspiration Cytology and Histopathology is 64%.
- In the present study we had 7 True positive cases, 43 True negative cases and 2 False negative cases in Touch imprint cytology. Concordance between Touch Impression Cytology and Histopathology is 86.27%.
- False negative results are more commonly encountered in Fine Needle Aspiration Cytology than Touch imprint cytology. The False negative results are due to inadequate and improper sampling technique and errors in interpretation. The Cystic lesions of thyroid and dual pathology in the thyroid lesions (example a dominant benign nodule may obscure a smaller

or more diffusely growing carcinoma) also cause False negative results. This can be minimized by strict adherence to adequacy criteria (five to six groups of cells showing more than ten cells in each group), proper sampling of tissues from representative areas preferably with ultrasound guidance and preparing high quality slides.

- Fine Needle Aspiration cytology is more specific than sensitive in diagnosing malignant thyroid neoplasms. It is a well-established technique for pre operative investigation . Fine Needle Aspiration cytology (FNAC) is a widely recognized practical and useful technique in the diagnosis of thyroid lesions. This technique is simple and rapid and shows excellent cellular details and no expensive instruments are needed .The cytological diagnosis is rapid and eliminates the need for surgical procedures .
- In the present study Touch imprint cytology have very high specificity(100%) and positive predictive value (100%) Therefore, imprint cytology is found to be comparable with frozen section in diagnostic accuracy
- Touch imprint cytology is a simple, rapid, inexpensive and sensitive technique for the intraoperative diagnosis of thyroid lesions. Due to high accuracy rate by imprint study ,this can be an useful guide in making

decisions regarding intraoperative nature of the lesion and to decide optimal extent of surgery required.

- In the present study the mean values of immunohistochemical proliferative marker Ki-67 labeling index progressively increases from multinodular goiter to anaplastic carcinoma .

CONCLUSION

Fine Needle Aspiration cytology is a cost effective, simple, rapid, almost noninvasive and an efficient method in differentiating benign and malignant lesions there by unnecessary surgical procedures can be reduced. High rate of diagnostic accuracy can be achived by use of ultrasound guidence with strict adherence to adequacy criteria and meticulous examination of all the smears.

- In the present study sensitivity, specificity and diagnostic accuracy of Fine Needle Aspiration cytology in diagnosing malignant thyroid neoplasms are 70%,100 %, and 94% respectively

Touch imprint cytology is a simple, inexpensive , rapid and sensitive technique for the Intraoperative diagnosis of thyroid lesions. Due to high accuracy rate achieved by imprintcytology, this can be an useful guide in making decisions regarding intraoperative nature of the lesion and to decide optimal extent of surgery required. Touch imprint cytology has further advantage of being inexpensive, rapid than frozen section and no expensive instruments are needed.

- In the present study Touch imprint cytology have very high specificity(100%) and positive predictive value (100%), therefore imprint cytology was found to be as good as frozen section in diagnostic accuracy.

Touch Imprint Cytology alone may provide a correct diagnosis in vast majority of cases with minimal expense and without the need of sophisticated cryostat machine thus making it quite suitable when cryostat machines are not available.

ANNEXURE-I

PROFORMA

Name : Age: Sex :

Unit : IP No.:

Address : D.O.A:

Occupation : D.O.D:

Presenting Complaints :
History of Present Illness :
Past History :

History of fever: History of cough :
Tuberculosis

Personal History:

Diet : Appetite :
Bowel : Bladder :
Smoking :

General Physical Examination:

Built : Nourishment :
Pallor : Lymphadenopathy :

Systemic Examination :

Per abdomen :
C.V.S. :
R.S. :
C.NS. :

Local Examination of the Swelling:

a) Site. b) Size
c) Surface d) Margins
e) Consistency f) Signs of inflammation

g) Fixity of skin
h) Fixity to underlying structures.
i) For midline swellings of the neck.
Movement with deglutition
Movement with protrusion of tongue

Investigations:

Blood: Hb% TC ; DC : ESR :

Urine : Albumin :
Sugar :

Chest X-Ray :

Ultrasound

Others :

Clinical Diagnosis :

Imprintcytology Diagnosis :

FNAC Diagnosis :

HPE Diagnosis :

ANNEXURE III

The procedure of FNAC:

- Needle positioned within the target tissue.
- The aspiration syringes used were 10-20ml and needle size between 22-23 gauges
- Plunger pulled to apply negative pressure
- Needle moved back and forth inside target,
- Negative pressure released while needle remains in target tissue
- Needle withdrawn
- Needle detached and air drawn into syringe
- Sample blown on to microscopy slide

The procedure of Imprint cytology :

- Imprint cytology smear was prepared on freshly cut surface of the specimen by a gentle press in a glass slide.
- Gliding movement should be avoided because it may distort the shape of the cells
- Then the slide was immediately wet fixed in ninety fivepercent ethyl alcohol for fivet to six seconds
- Then the smears were stained with haematoxylin and eosin

The procedure of histopathological examination

- The received specimens were fixed in 10% buffered neutral formalin. Processed either in toto or as small sections of 2-3 mm thickness
- After paraffin embedding sections of 5-micron thickness were cut and stained with hematoxylin and eosin

Hematoxylin And Eosin Staining Procedure

1. Bring Sections to water.
2. Harris's hematoxylin for 15 minutes.
3. Rinse in tap water.
4. Differentiate in acid alcohol – 3 to 10 quick dips.
5. Wash in tap water very briefly.
6. Dip in ammonia water (for 10-20 seconds) saturated lithium carbonate until sections are bright blue.
7. Wash in running tap water for 10-20 minutes.
8. Stain with eosin for 2 minutes
9. Wash in tap water.
10. Dehydrate with Absolute alcohol .
11. Clear with Xylene – 2 changes.
12. Mount in DPX mountant

Ki67 Immunohistochemistry procedure

1. Immunohistochemistry was performed on 3- micron thick sections on poly-l-lysine-coated slides.
2. Antigen retrieval was done using microwave in citrate buffer at pH 6.
3. Monoclonal antibody MIB1 was used for Ki-67 antigen detection by standard streptavidin-biotin technique
4. Sections from a reactive lymph node were taken as positive control , whereas sections treated with tris-buffer solution instead of primary antibody were used as negative control.
5. Brown granular nuclear reactivity was positive.
6. An area with the maximum proliferation was chosen to evaluate the labeling index (LI, expressed as percentage of positively stained cells per 100 follicular epithelial cells) after counting at least 1000 cells in each case.

ANNEXURE- II

World Health Organization (WHO) classification(2004) of Tumors Of The Thyroid Gland

- Papillary carcinoma
- Follicular carcinoma
- Medullary thyroid carcinoma
- Undifferentiated (anaplastic) carcinoma
- Poorly differentiated carcinoma
- Mucoepidermoid carcinoma
- Squamous cell carcinoma
- Sclerosing mucoepidermoid carcinoma with eosinophilia
- Mucinous carcinoma
- Mixed medullary and follicular cell carcinoma
- Spindle cell tumor with thymus-like differentiation
- Carcinoma showing thymus-like differentiation

Thyroid adenomas and related tumors

Follicular adenoma

Hyalinizing trabecular tumor

Other thyroid tumors

Teratoma

Primary lymphoma and plasmacytoma

Ectopic thymoma

Angiosarcoma

Smooth muscle tumors

Peripheral nerve sheath tumors

Paraganglioma

Solitary fibrous tumor

Follicular dendritic cell tumor

Langerhans cell histiocytosis

Secondarytumors

ANNEXURE – IV

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ANNEXURE V

MASTER CHART- A

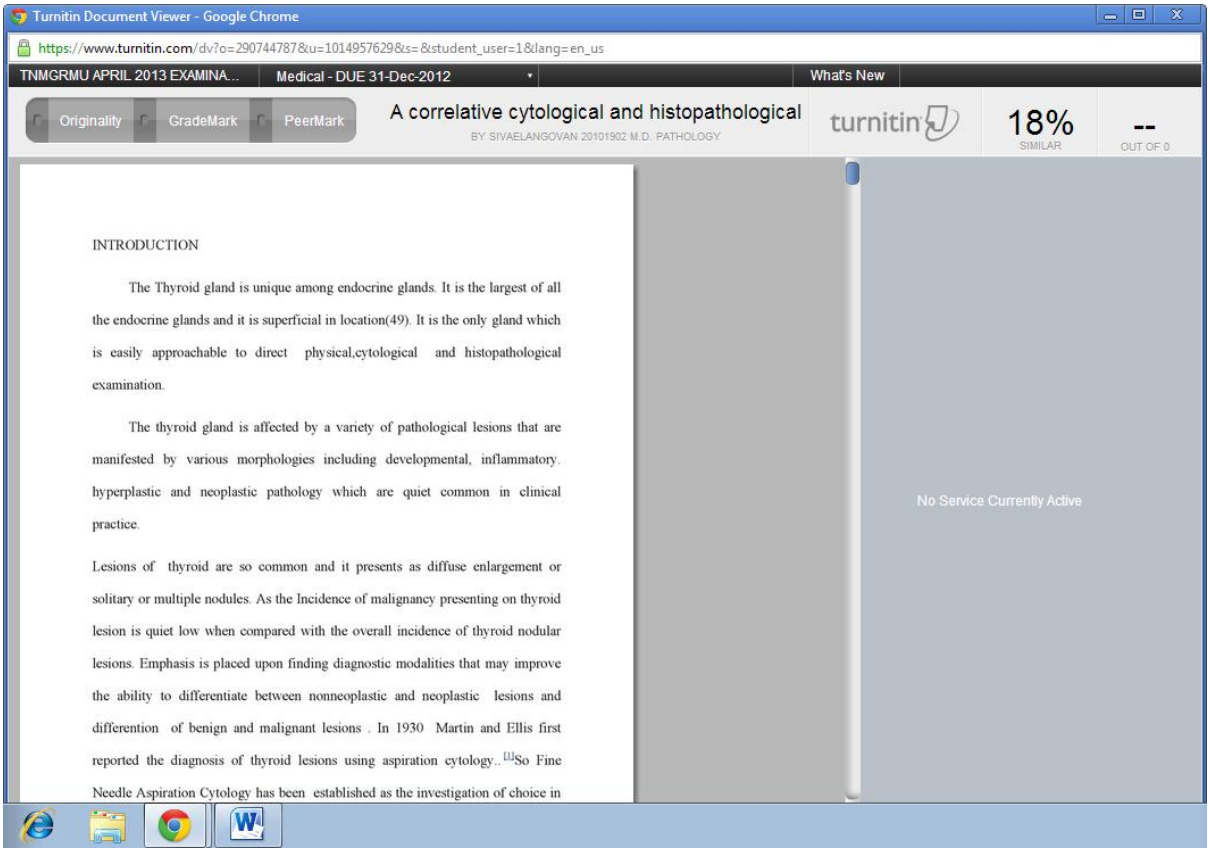
(Thyroid lesions -FNAC with HPE Correlation)

MASTER CHART- B

(Thyroid lesions -FNAC,TIC with HPE Correlation)

ABBREVIATIONS

F	:	Female
M	:	Male
MNG	:	Multi Nodular Goiter
SNG	:	Solitary Nodular Goiter
FNAC	:	Fine Needle Aspiration Cytology
TIC	:	Touch Imprint Cytology
HPE	:	Histopathological Examination
IHC	:	Immuno Histo Chemistry
NCG	:	Nodular colloid goiter
FOLL . NEO	:	Follicular Neoplasm
PAP.CA	:	Papillary Carcinoma
LYM.THY	:	Lymphocytic Thyroiditis
GRA.THY	:	Granulomatous Thyroiditis
MNG	:	Multi Nodular Goiter
PAP.CA (MC)	:	Papillary Micro Carcinoma Thyroid
PAP.CA (FV)	:	Follicular Variant Of Papillary Carcinoma Thyroid
HASH.THY	:	Hashimato Thyroiditis
FOLL.ADE	:	Follicular Adenoma
CA. THYROID	:	Carcinoma Thyroid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INTRODUCTION
The Thyroid gland is unique among endocrine glands. It is the largest of all the endocrine glands and it is superficial in location(49). It is the only gland which is easily approachable to direct physical,cytological and histopathological examination.
The thyroid gland is affected by a variety of pathological lesions that are manifested by various morphologies including developmental, inflammatory. hyperplastic and neoplastic pathology which are quiet common in clinical practice.
Lesions of thyroid are so common and it presents as diffuse enlargement or solitary or multiple nodules. As the Incidence of malignancy presenting on thyroid lesion is quiet low when compared with the overall incidence of thyroid nodular lesions. Emphasis is placed upon finding diagnostic modalities that may improve the ability to differentiate between nonneoplastic and neoplastic lesions and differention of benign and malignant lesions . In 1930 Martin and Ellis first reported the diagnosis of thyroid lesions using aspiration cytology..[1]So Fine Needle Aspiration Cytology has been established as the investigation of choice in
No Service Currently Active

PHOTOS

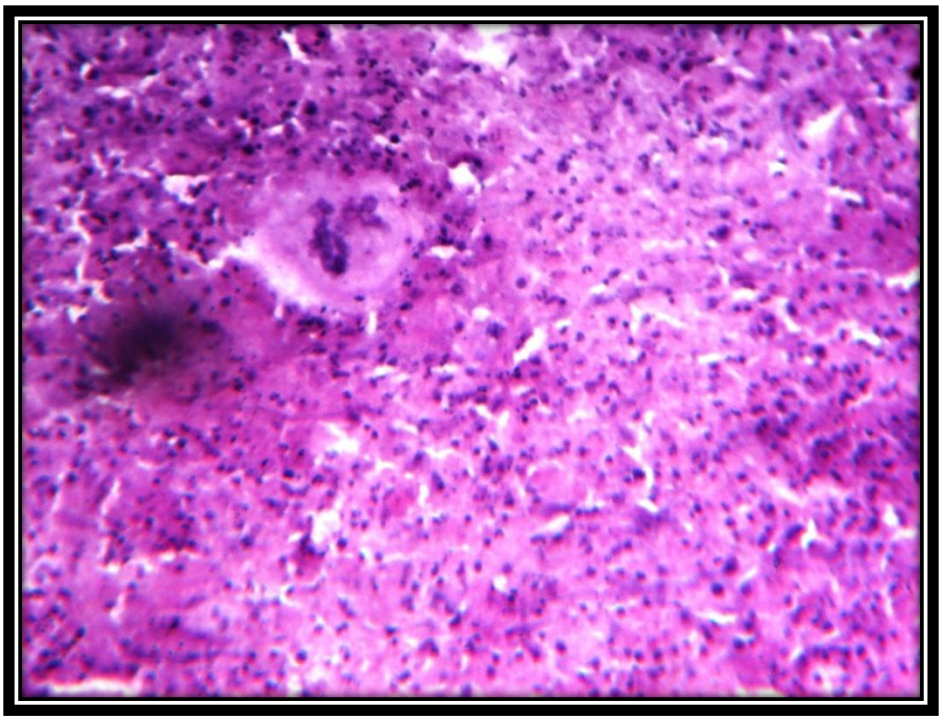


Fig -1.Granulomatous thyroiditis: TIC Smear shows Multinucleate histiocytic giant cells , dirty background of colloid , inflammatory cells and degenerated epithelial cells H&EX100 (CY724/12)

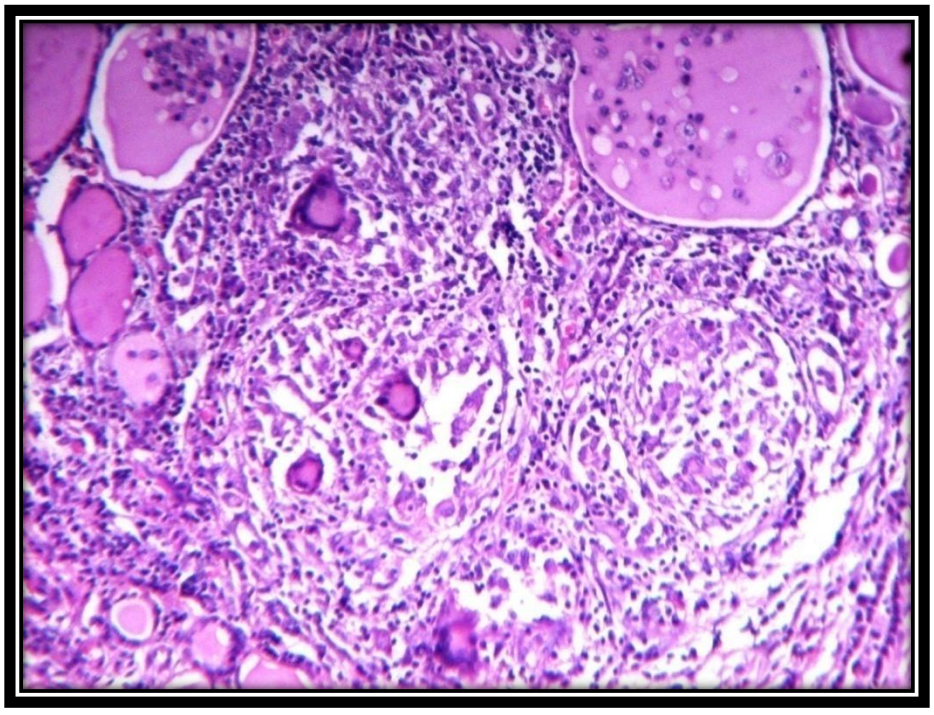


Fig -2. Granulomatous Thyroiditis: Photomicrograph shows macrophages,plasma cells about collapsed and damaged thyroid follicles and Multinucleate giant cells .H&EX100 (1417/12)

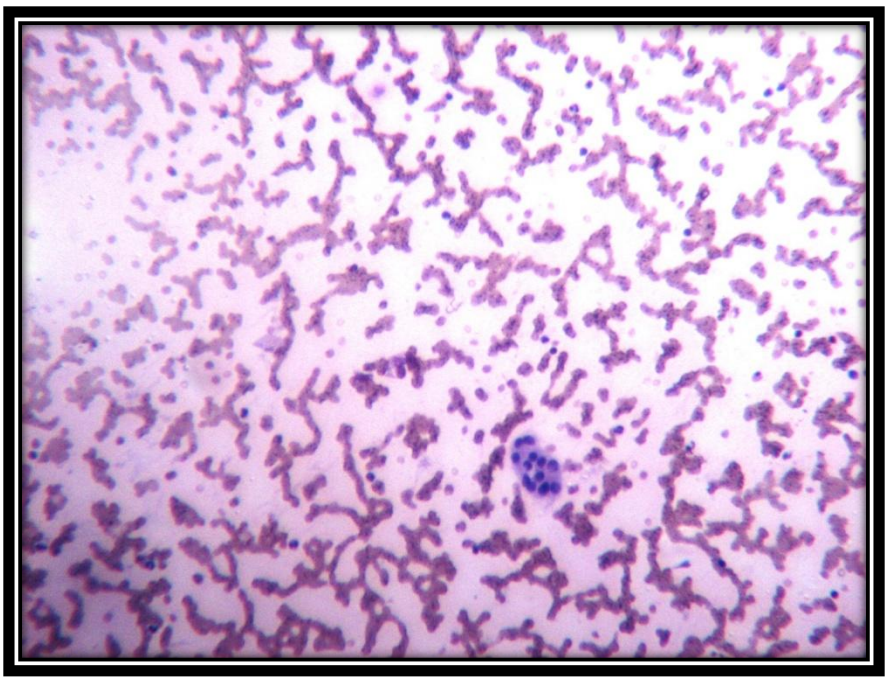


Fig- 3.Hashimoto thyroiditis :Photomicrograph -FNAC smear shows hurthle cells. H&Ex100 (CY 182/12)

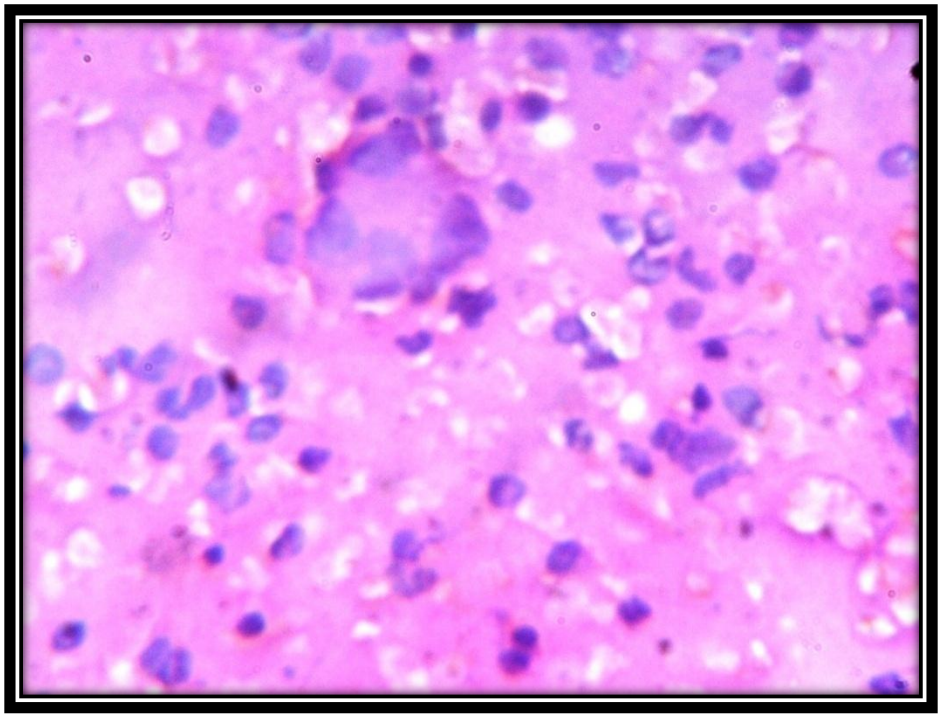


Fig -4.Hashimoto thyroiditis :TIC smear shows Syncytial cluster of hurthle cells showing abundant cytoplasm with anisokaryosis H&Ex400 (CY263/12)

Fig -5.Hashimato thyroiditis :Cut surface is pale, yellow tan in appearence .Gross specimen (481/12)

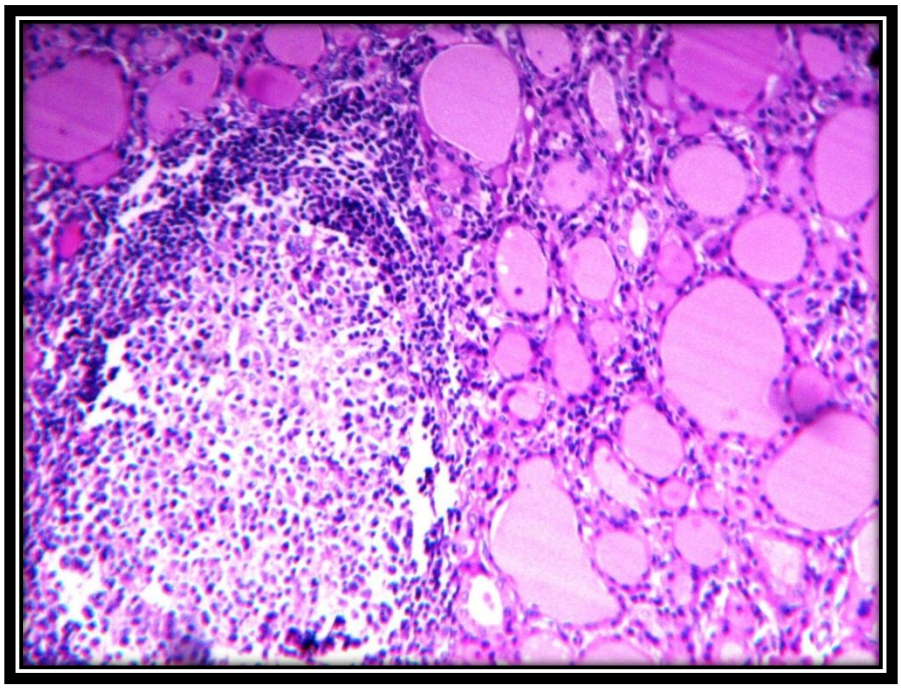


Fig -6.Hashimoto thyroiditis : Photomicrograph shows infiltration of the parenchyma by mononuclear inflammatory infiltrate and well-developed germinal center H&Ex100 (1419/12)

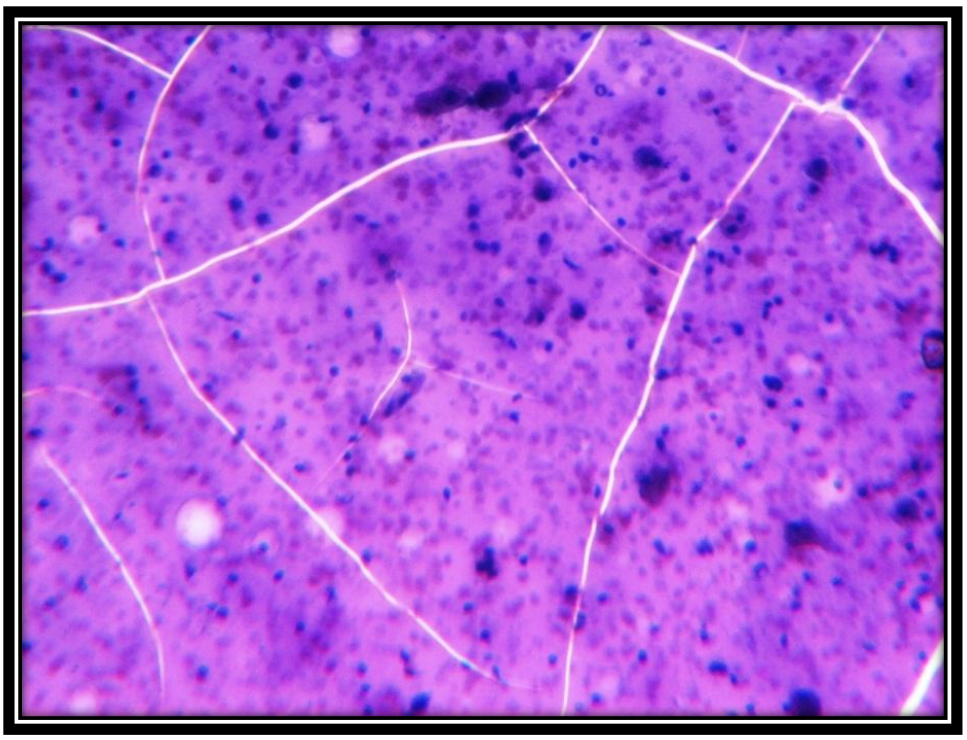


Fig-7.FNAC- Smear showing follicular epithelial cells in background of colloid H&Ex100 (CY153/12)

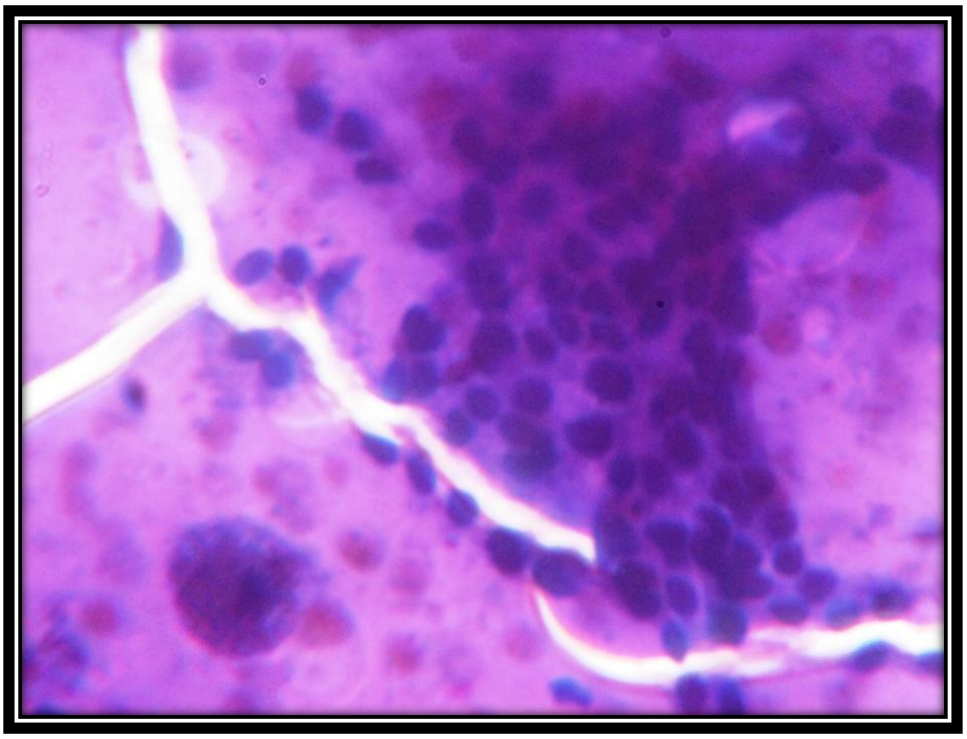


Fig-8.TIC Smear showing follicular epithelial cells and foamy macrophages in background of colloid H&Ex400 (CY287/12)

Fig-9.Multi nodular goiter: Gross morphology showing a coarsely nodular gland with areas of fibrosis and cystic change . Gross specimen (198/12)

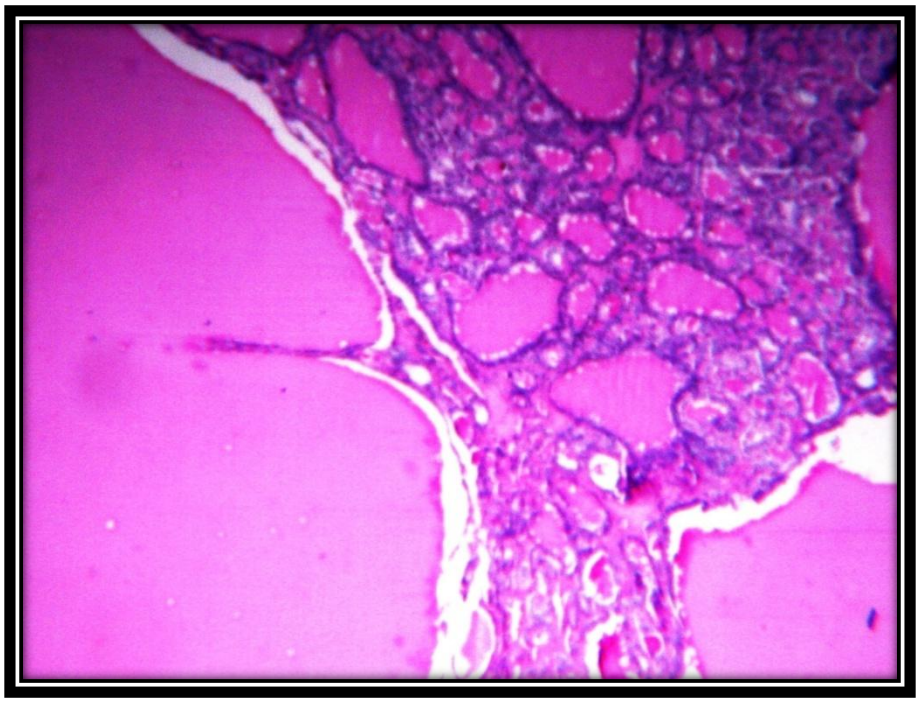


Fig -10.Multinodular goiter Photomicrograph shows colloid-rich follicles and areas of follicular hyperplasia H&Ex100 (4188/12)

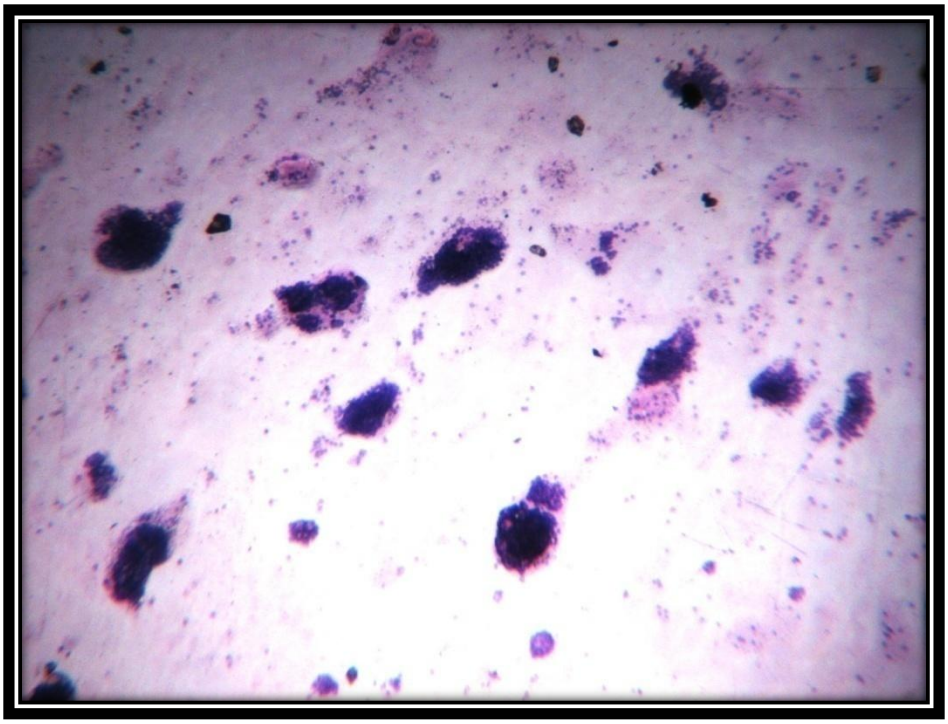


Fig-11. Follicular neoplasm: FNAC Smear showing follicular epithelialcells arranged in repetitive follicular pattern. H&Ex100 (CY 518/12)

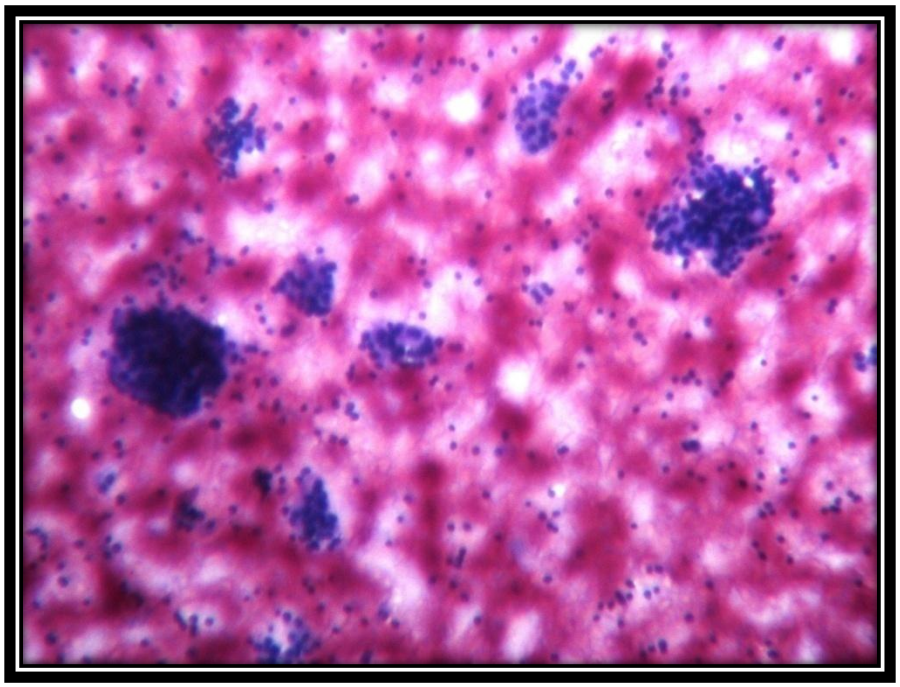


Fig-12.Follicular neoplasm: TIC smear showing follicular epithelialcells arranged in repetitive follicular pattern. H&Ex100 (CY 5/12)

Fig -13.Follicular adenoma:showing well encapsulated nodule. Gross specimen (259/12)

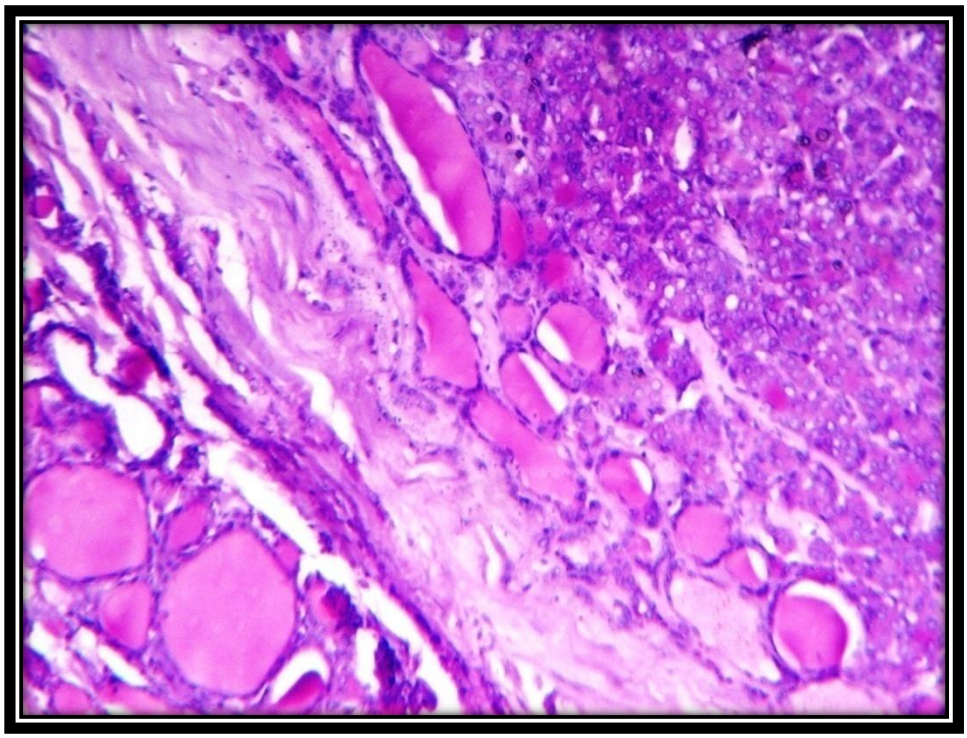


Fig-14: Follicular adenoma : Photomicrograph shows well formed capsule encircling the tumor H&Ex100 (727/12)

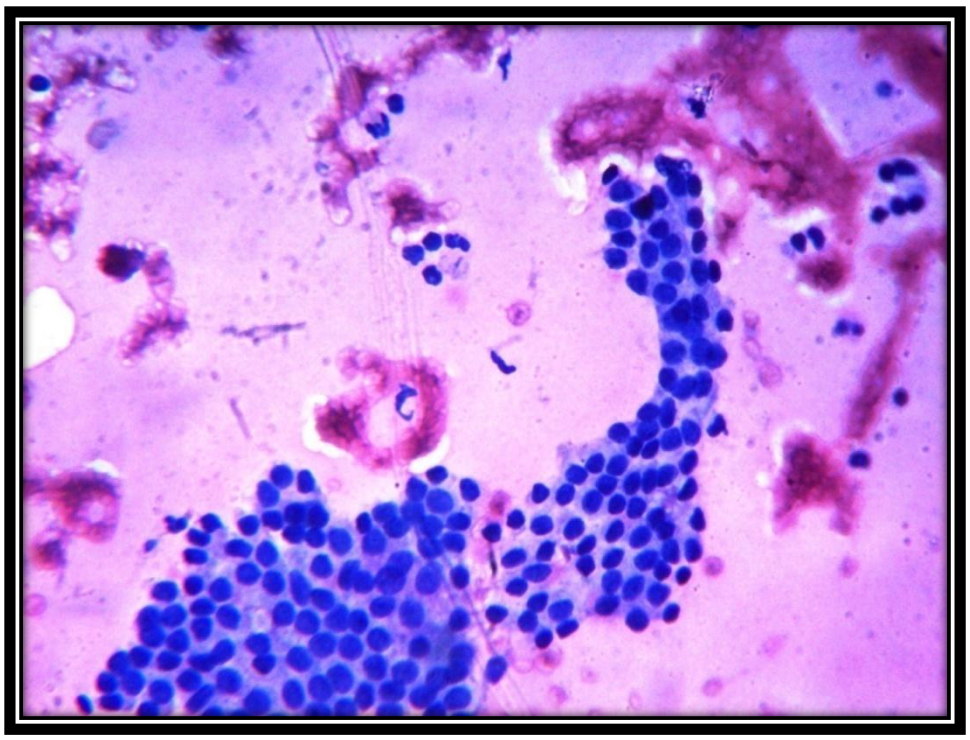


Fig-15. FNAC Smear showing papillary fronds with anatomical edging H&Ex100 (CY1911/12)

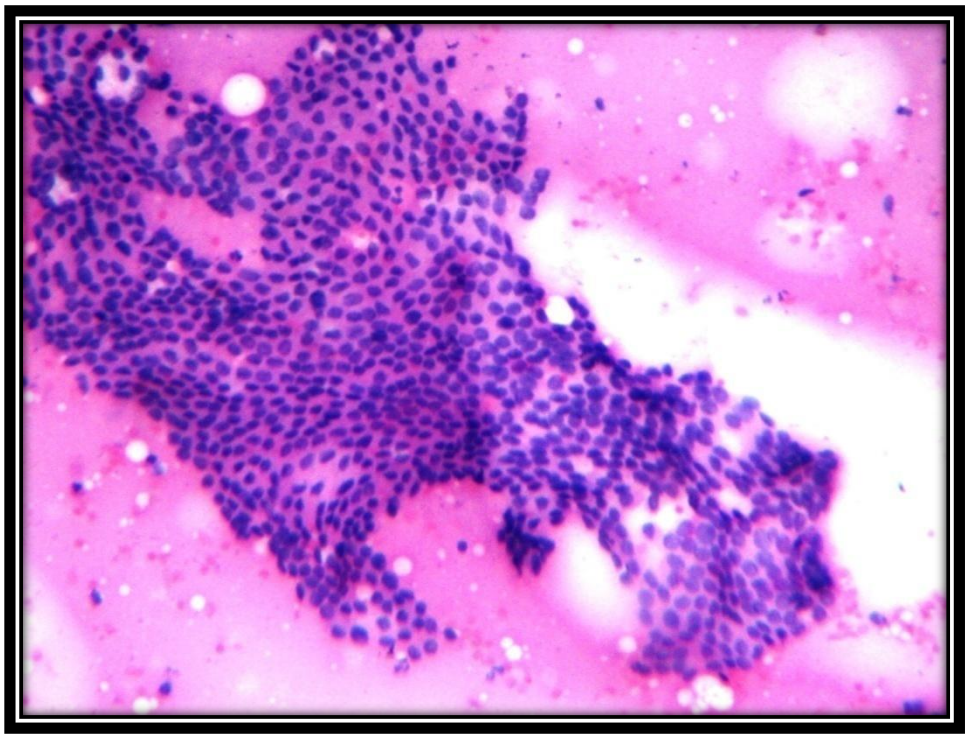


Fig-15. FNAC Smear showing papillary fronds with anatomical edging H&Ex100 (CY1911/12)

Fig- 17.Macroscopic appearance of Papillary carcinoma of thyroid showing focal greyish white tumor (215/12)

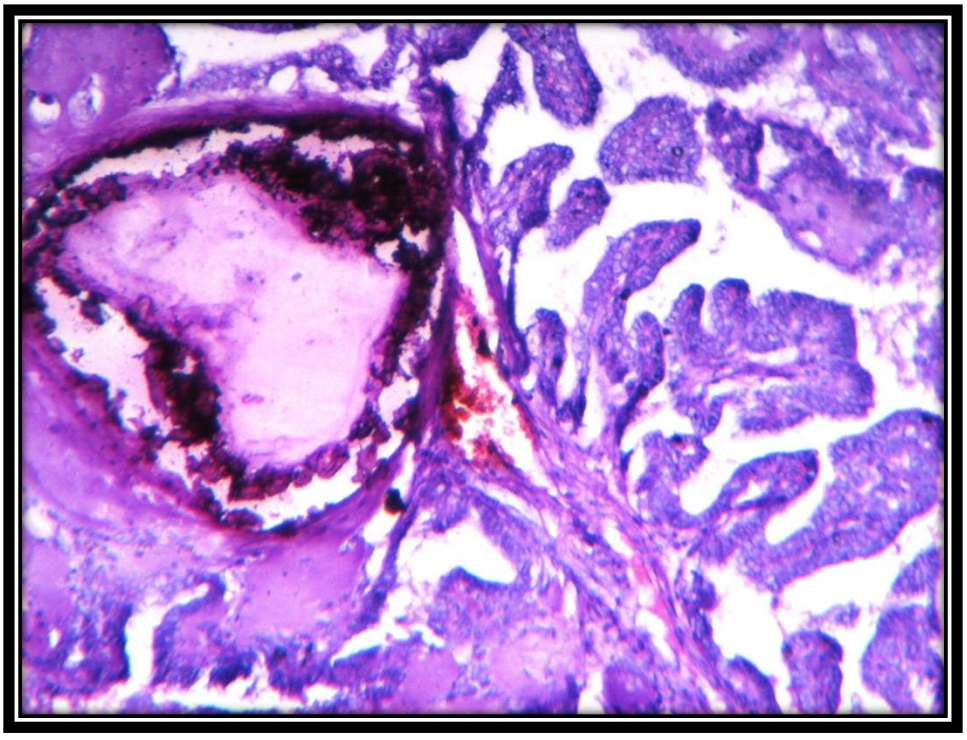


Fig-18 Papillary carcinoma Photomicrograph shows psammoma bodies within the cores of papillae H&Ex100 (215/12)

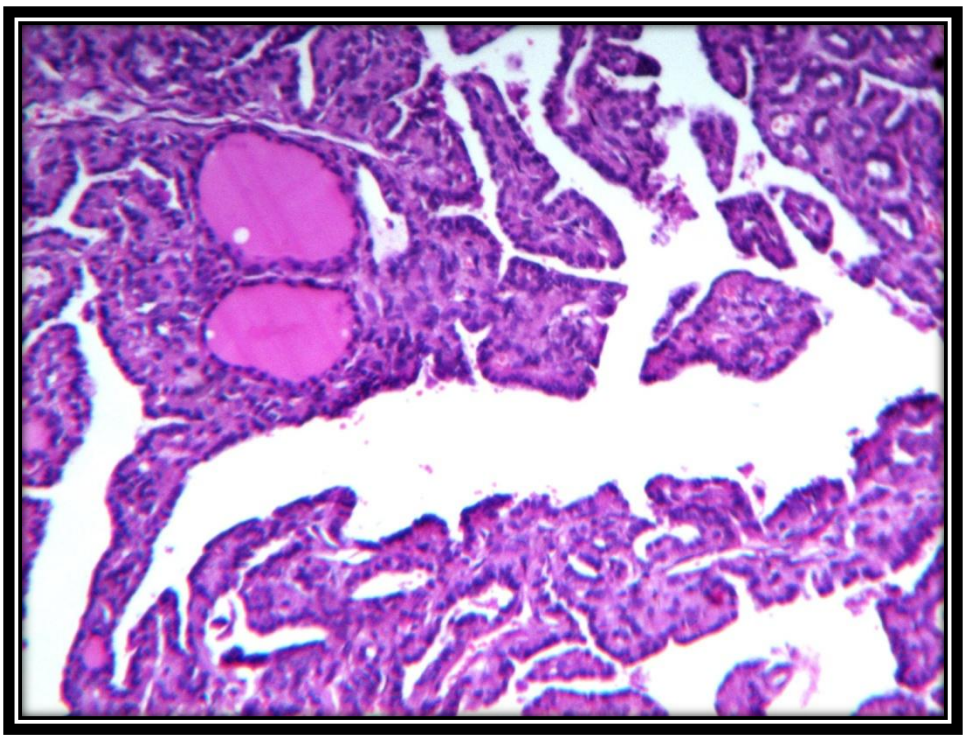


Fig-19 Papillary carcinoma :Photomicrograph shows branching papillae having a fibrovascular stalk covered by a single to multiple layers of cuboidal epithelial cells. H&Ex100 (104/12)

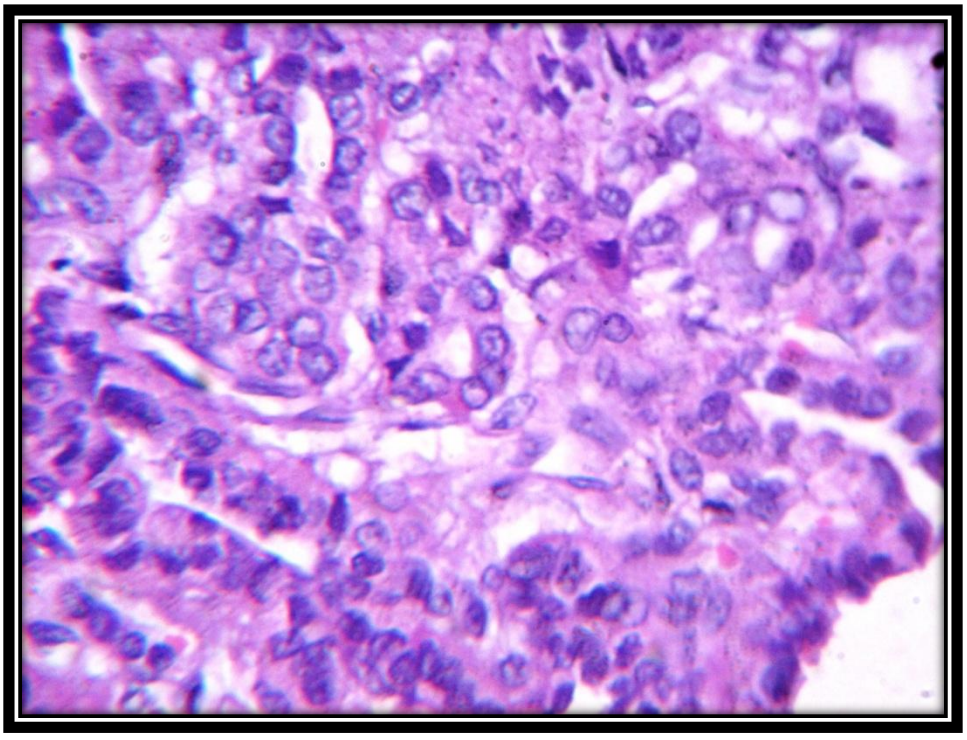


Fig-20.The nuclei of papillary carcinoma cells contain finely dispersed chromatin, with an optically clear or empty appearance(Orphan Annie eye nuclei) H&Ex400 (215/12)

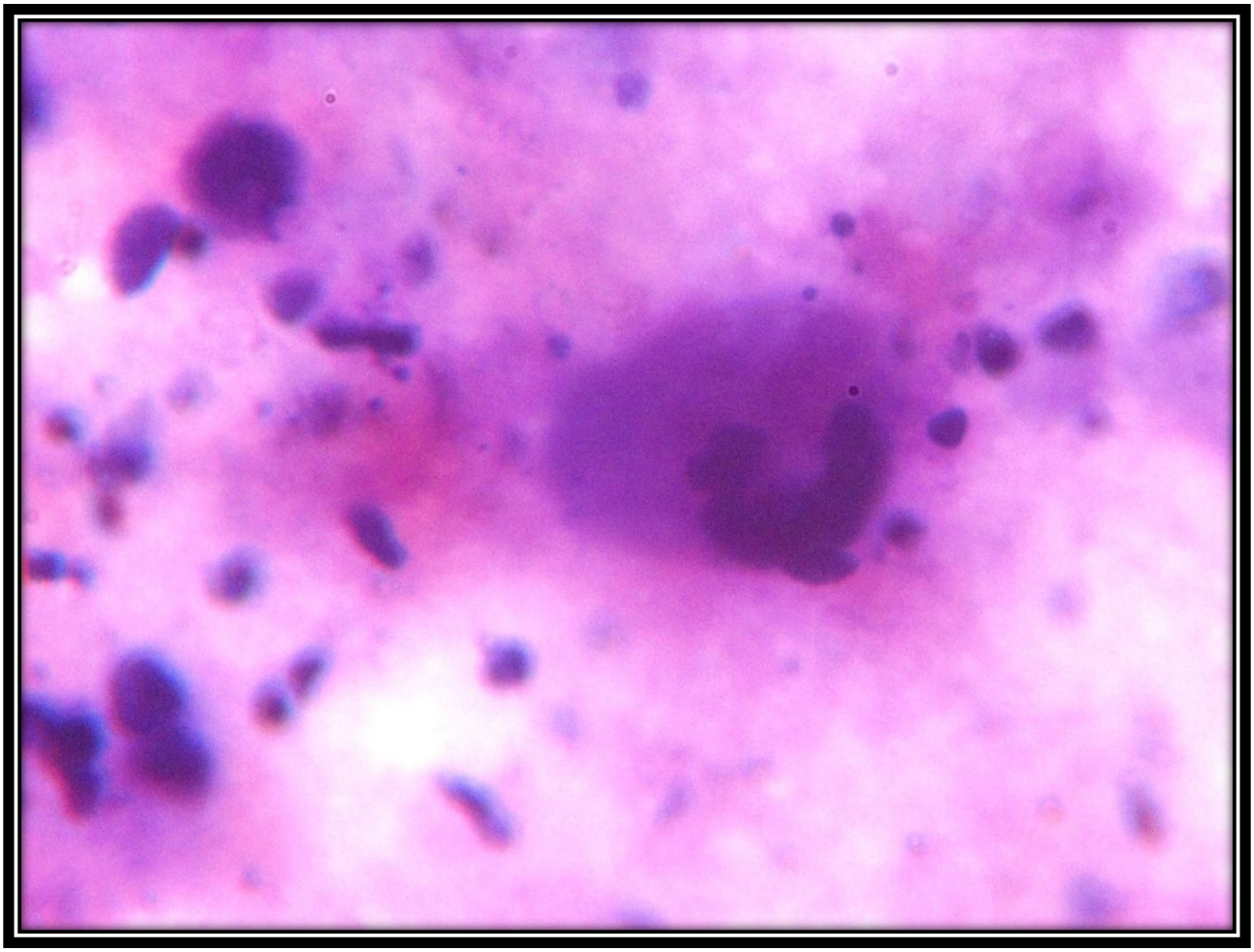


Fig-21.Anaplastic carcinoma :FNA Cytology smear shows histiocyte-like giant cell with fibroblastoid spindle cells H&Ex400 (CY4113a/12)

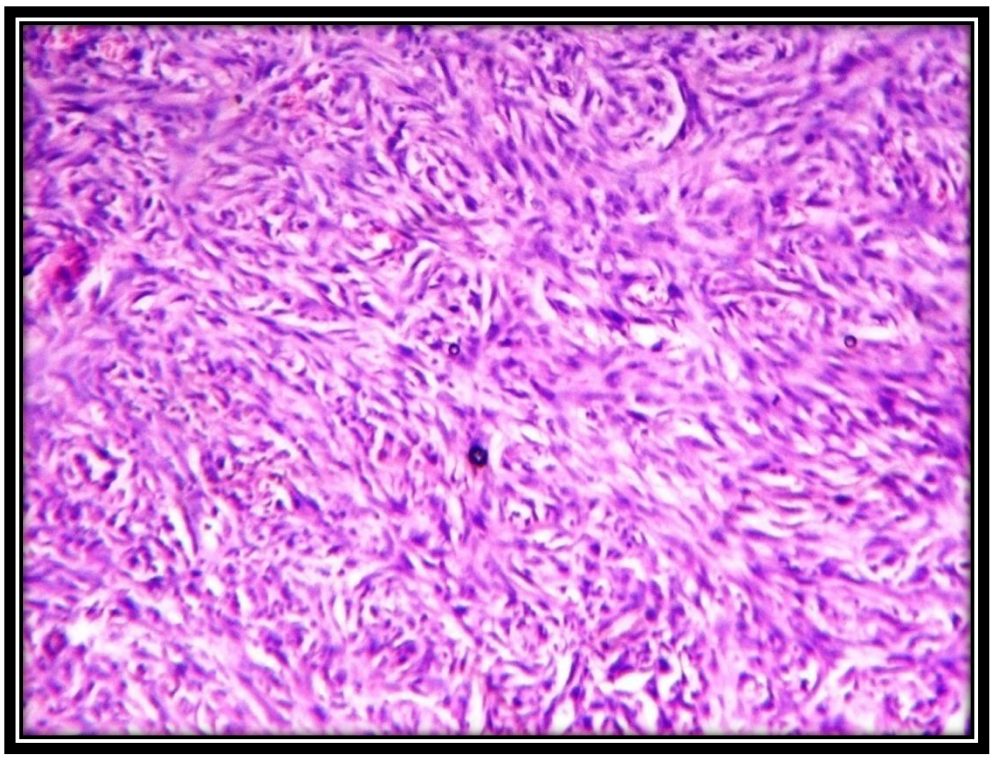


Fig-22.Anaplastic carcinomas :Highly anaplastic spindle cells with a sarcomatous appearance H&Ex100 (4113X11)

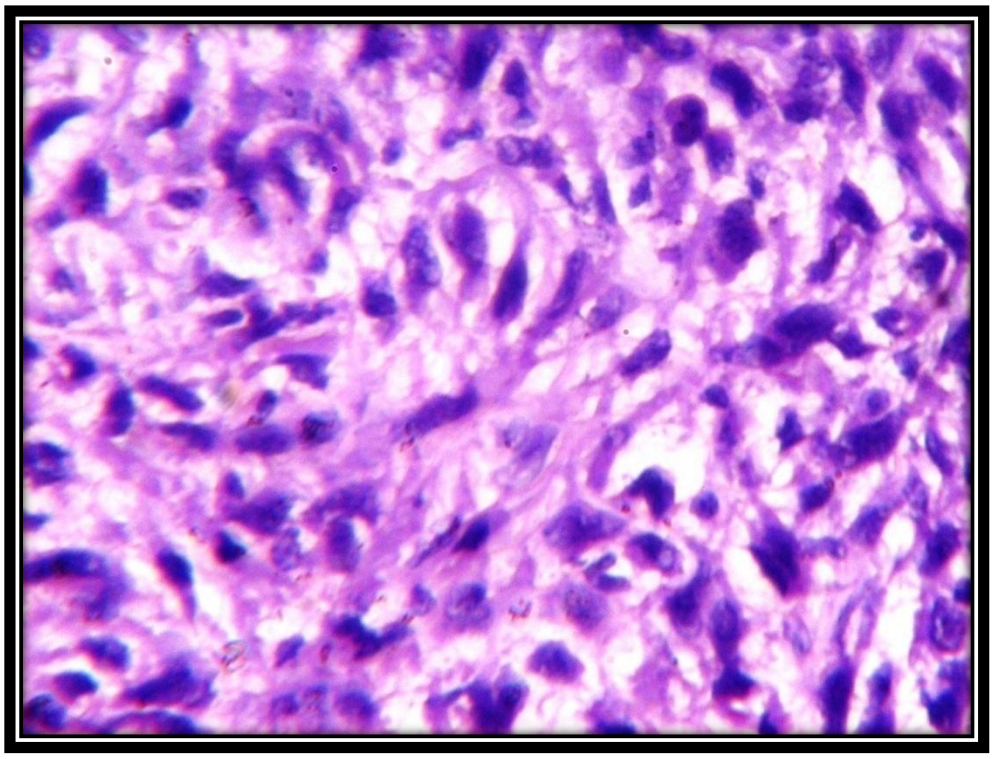


Fig-23.Anaplastic carcinoma :Highly anaplastic spindle cells with nuclear atypia H&Ex400 (4113X11)

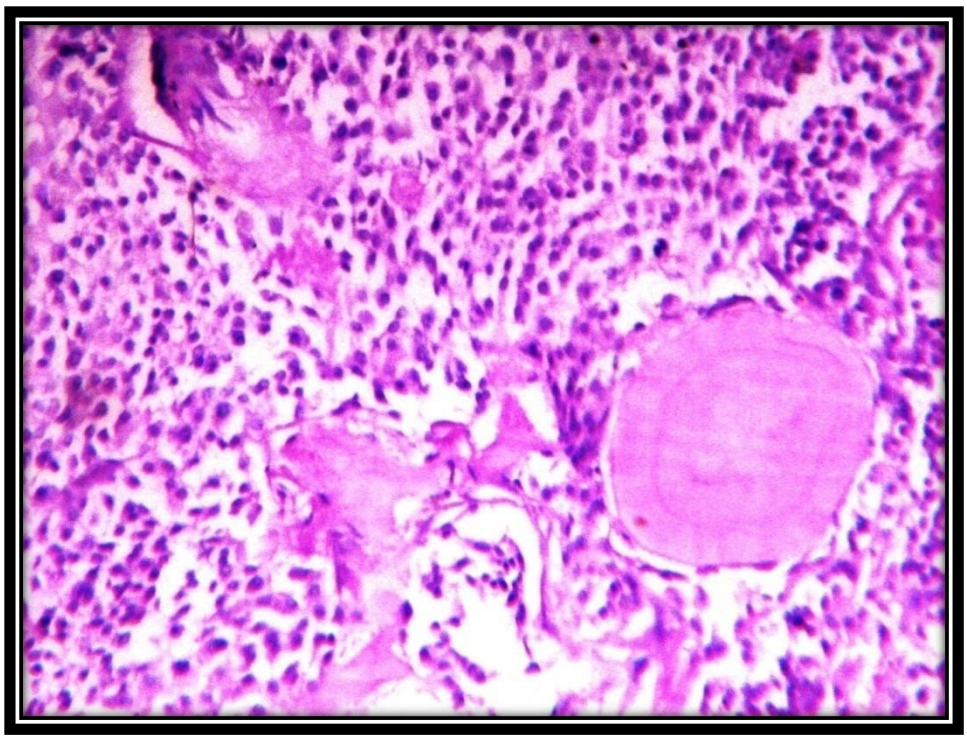


Fig- 24.Medullary carcinoma: Histology shows abundant deposition of amyloid, visible as homogenous extracellular material H&E x100 (1385/12)

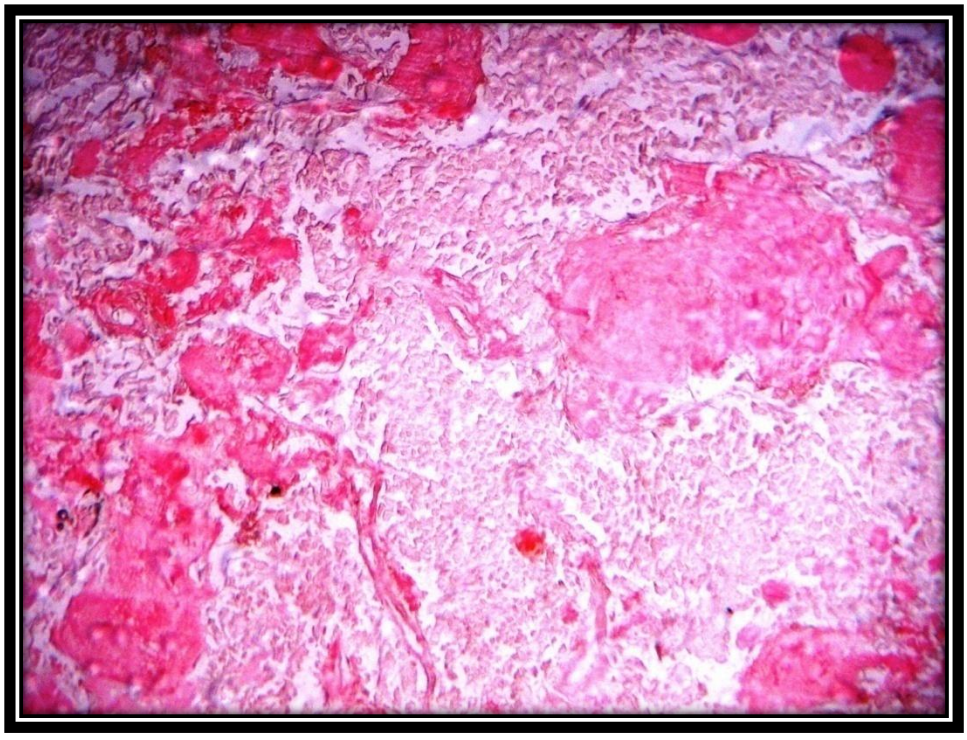


Fig-25.Medullary carcinoma: Histology shows abundant deposition of amyloid, visible as homogenous extracellular material x100(1385/12) . Congo-red stain.

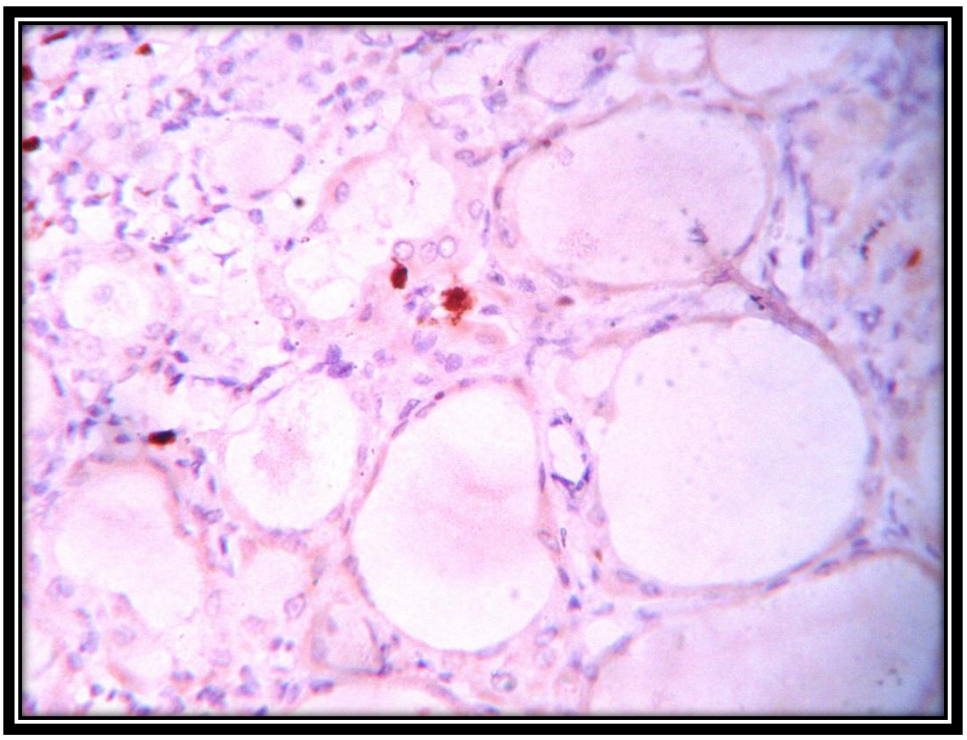


Fig – 26. Ki-67 Immunohistochemical staining-MNG Very few cells positive x100(1036/12)

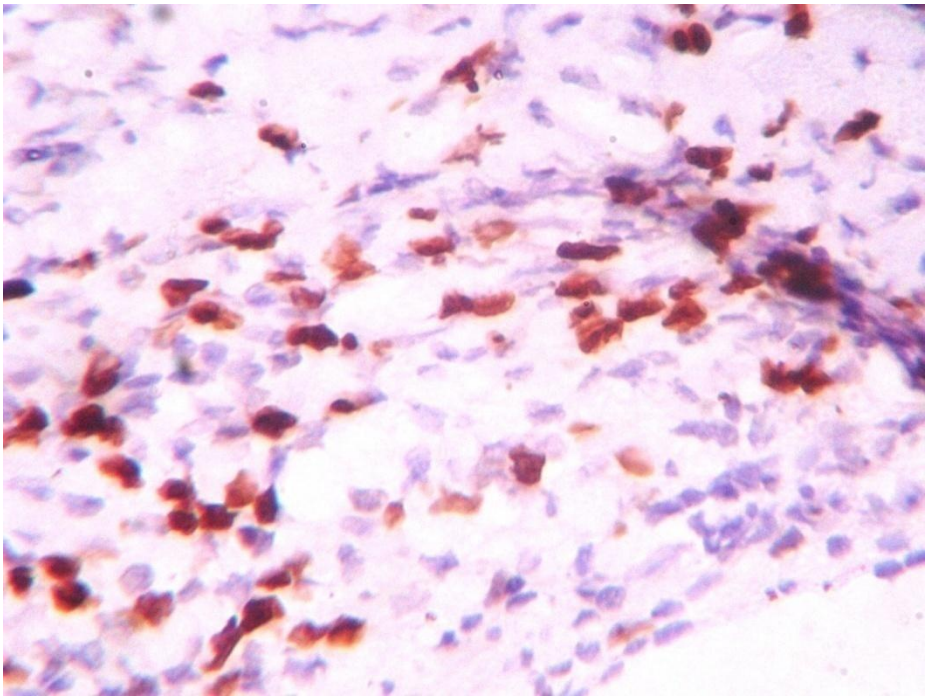


Fig- 27.Ki-67 Immunohistochemical staining- Follicular adenoma Positive x 100 (853/12)

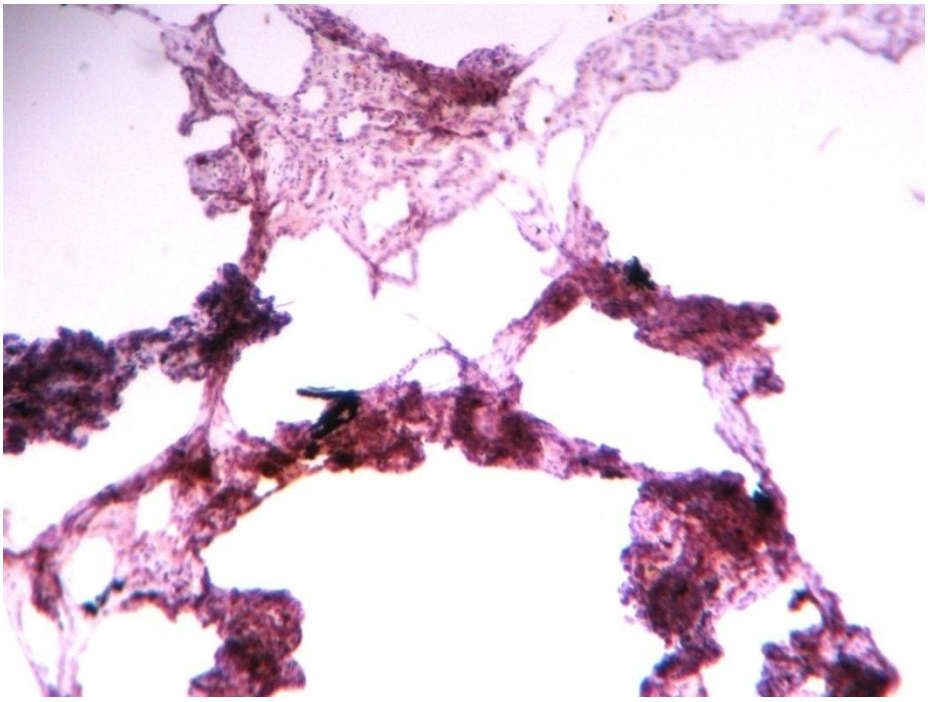


Fig- 28.Papillary carcinoma Ki-67 Immunohistochemical staining- Positive (1 to 2%) x100(4201/11)

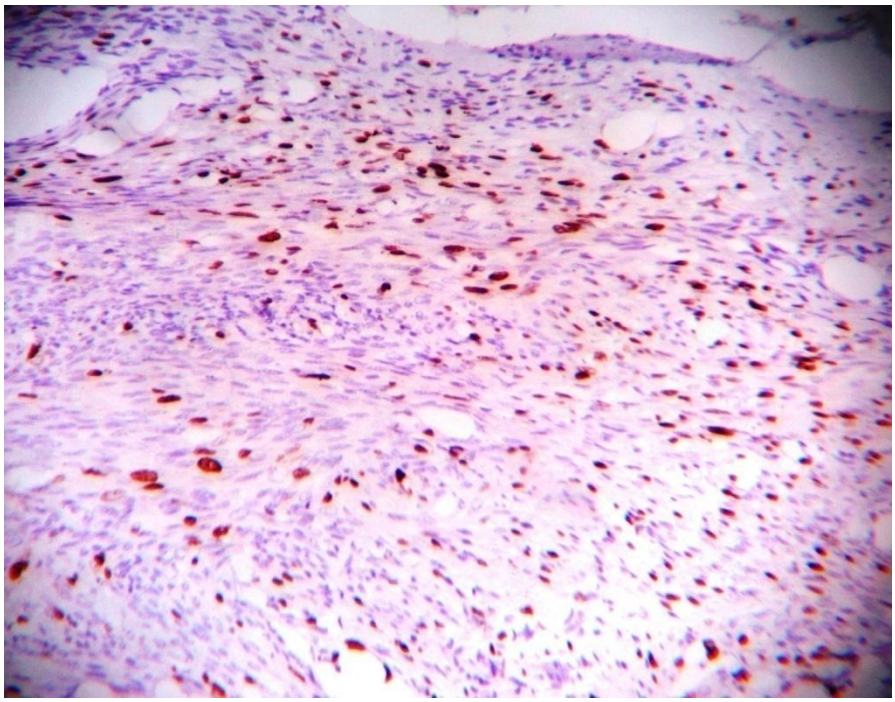


Fig- 29. Anaplastic carcinoma Ki-67 Immunohistochemical staining- Strong Positivityx100

(4113/11)

MASTER CHART - A

S.No	NAME	AGE	SEX	CLINICAL DIAGNOSIS	FNAC NO	FNAC -DIAGNOSIS	HPE NO	HPE DIAGNOSIS
1	VICTORIA	51	F	SNG	491/10	NCG	1508/10	MNG
2	REVATHY	25	F	MNG	535/10	HASH.THY	1661/12	HASH.THY
3	CHITRA	31	F	SNG	568/10	NCG	1291/11	FOLL.ADE
4	VASANTHA MALAI	22	F	SNG	578/10	NCG	1824/10	FOLL.ADE
5	AYYAMMAL	60	F	MNG	675/10	NCG	1905/10	MNG
6	USHARANI	28	F	MNG	677/10	NCG	1840/10	MNG
7	MEENA	41	F	MNG	686/10	NCG	1820/10	MNG
8	SABITHA	32	F	SNG	753/10	LYM.THY	1388/11	FOLL.ADE
9	SHANTHI	39	F	MNG	796/10	NCG	2196/11	MNG
10	SARASWATHY	50	F	MNG	810/10	NCG	1985/10	MNG
11	ROHINI	28	F	MNG	813/10	NCG	1834/10	MNG
12	AMBIKADEVI	29	F	SNG	977/10	FOLL.NEO	726/11	MNG
13	LAXMI	57	F	SNG/? CA.THYROID	978/10	HASH.THY	3467/10	PAP.CA
14	SAVITHIRI	20	F	SNG	1018/10	FOLL.NEO	2816/10	FOLL.ADE
15	SANTHANAM	38	F	MNG	1157/10	NCG	2915/10	MNG
16	MURUGAESWARI	25	F	SNG	1164/10	NCG	3767/10	FOLL.ADE
17	MURUGAN	35	M	CA.THYROID	1585/10	NCG	1385/10	MEDU. CA
18	RAKKU	50	F	CA THYROID	1425/10	PAP.CA	3662/10	PAP.CA
19	ESWARI	39	F	MNG	1499/10	HASH.THY	1694/10	MNG
20	KARUPPASAMY	48	M	CA THYROID/MNG	1527/10	PAP.CA	3793/10	PAP.CA
21	SELVI	26	F	MNG	1645/10	NCG	1401/11	MNG
22	VASANTHA	52	F	MNG	1653/10	NCG	734/11	MNG
23	SARAMMAL	41	F	MNG	36/11	NCG	2499/11	HASH.THY
24	LAXMI	22	F	MNG	217/11	NCG	2444/11	MNG
25	LAXMI	34	F	SNG	405/11	NCG	2010/11	FOLL.ADE
26	SELVI	35	F	SNG	421/11	NCG	1586/11	FOLL.ADE
27	CHINNAMMAL	35	F	SNG	513/11	FOLL.NEO	1362/11	MNG
28	KAMALA	50	f	MNG	515/11	NCG	1456/11	MNG
29	MAHALAKSHMI	54	F	MNG	542/11	NCG	1920/11	HASH.THY
30	RAJESHWARI	32	F	COLLOID GOITER	711/11	NCG	2588/11	MNG
31	MUTHAMMAL	60	F	MNG	789/11	NCG	2889/11	MNG
32	PALANIYAMMAL	44	F	MNG	795/11	NCG	2013/11	FOLL.ADE

33	SUBBULAXMI	50	F	SNG	899/11	NCG	2277/11	MNG
34	PREMALATHA	44	F	MNG	929/11	NCG	2429/11	MNG
35	LAXMI	53	F	SNG	960/11	NCG	2561/11	FOLL.ADE
36	RAJENDRAN	30	M	MNG	981/11	NCG	2497/11	MNG
37	SELVI	26	F	MNG	982/11	NCG	2657/11	HASH.THY
38	JEYANTHI	30	F	COLLOID GOITER	1049/11	NCG	2641/11	FOLL.ADE
39	MANJULADEVI	23	F	SNG	1093/11	NCG	2935/11	FOLL.ADE
40	VIMALA	30	F	SNG	1098/11	NCG	2745/11	FOLL.ADE
41	RAJAMMAL	65	F	MNG	1155/11	NCG	2848/11	HASH.THY
42	JESU MARY	36	F	SNG	1331/11	NCG	4284/11	FOLL.ADE
43	REGINA MARY	44	F	CA.THYROID/MNG	1353/11	NCG	3189/11	PAP.CA
44	MEENAXI	55	F	MNG	1385/11	PAP.CA	3921/11	HASH.THY
45	SELVI	23	F	MNG	1453/11	NCG	3328/11	MNG
46	RATHI MALA	18	F	MNG	1569/11	NCG	3963/11	MNG
47	LATHA	38	F	MNG	1612/11	NCG	3934/11	HASH.THY
48	CHANDRIKA	40	F	MNG	1631/11	NCG	3809/11	MNG
49	PITCHAINATCHAL	30	F	MNG	1695/11	NCG	3961/11	FOLL.ADE
50	MUTHAMMAL	70	F	CA.THYROID	1702/11	ANA. CA.	4113/11	ANA. CA.
51	ABITHABANU	26	F	?CA.THYROID	1736/11	NCG	4201/11	PAP.CA
52	INDIRA	36	F	MNG	1779/11	NCG	4128/11	MNG
53	KARUPIAH	27	F	SNG	1819/11	PAP.CA	4309/11	MNG
54	RAJAMANI	25	F	SNG	1820/11	PAP.CA	199/12	PAP.CA
55	ANNALAXMI	43	F	SNG	1849/11	NCG	4153/11	FOLL.ADE
56	SURULIYAMMAL	50	F	MNG	1865/11	NCG	4188/11	MNG
57	CHITRA	24	F	MNG	1908/11	NCG	4287/11	MNG
58	MUHUKUMAR	35	M	CA.THYROID	1911/11	PAP.CA	4311/11	PAP.CA
59	PALANIYAMMAL	48	F	MNG	1915/11	NCG	4446/11	MNG
60	PETCHIYAMMAL	55	F	CA.THYROID	1968/11	PAP.CA	131/12	PAP.CA
61	DHANAM	55	F	MNG	005/12	FOLL.NEO	009/12	MNG
62	USHA	35	F	MNG	38/12	NCG	51/12	MNG
63	MAHESWARI	24	F	MNG	40/12	NCG	103/12	PAP.CA
64	MANIKA VALLI	26	F	COLLOID GOITER	49/12	NCG	465/12	HASH.THY

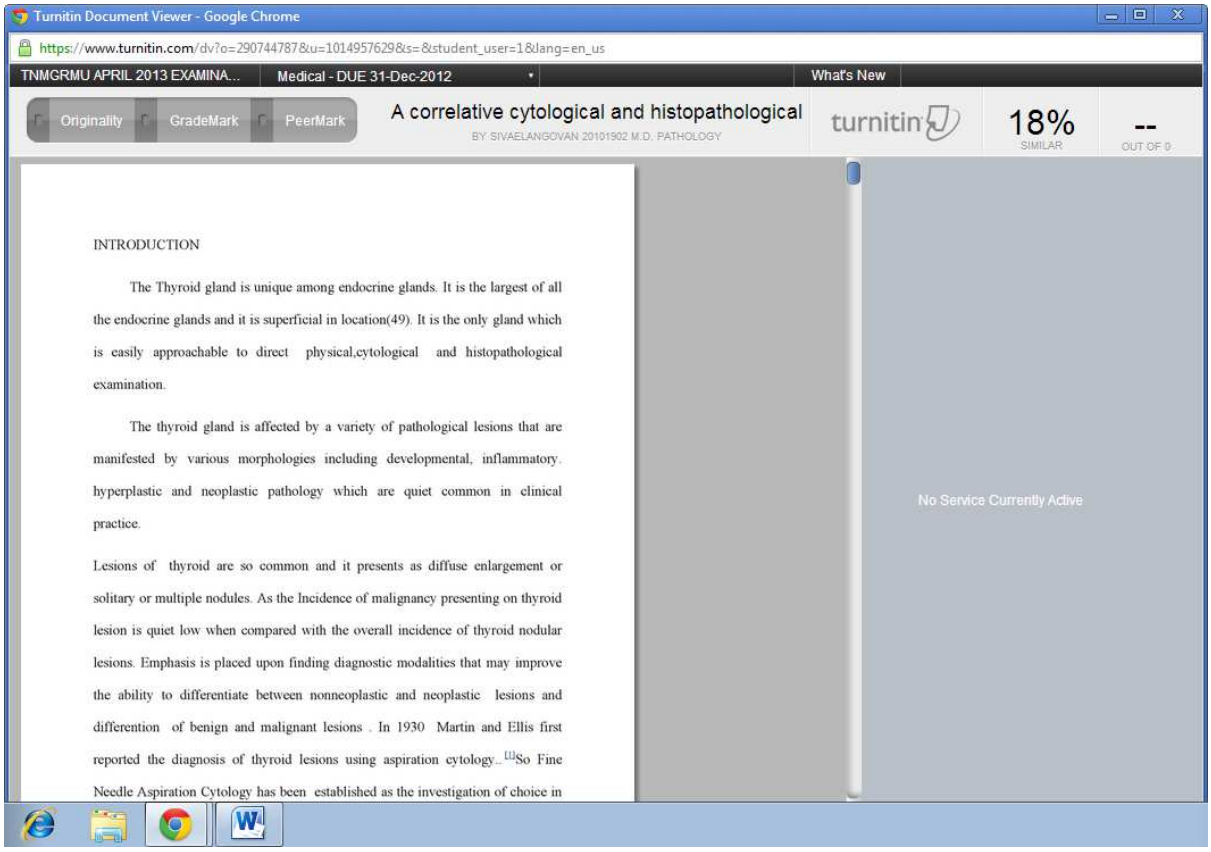
65	MOKKAI	41	M	MNG	58/12	NCG	213/12	MNG
66	RAMUTHAI	45	F	MNG	39/12	NCG	210/12	MNG
67	TAMILARASI	30	F	CA.THYROID	63/12	PAP.CA	104/12	PAP.CA
68	PANDIYAMMAL	60	F	MNG	75/12	NCG	214/12	MNG
69	VEERAMMAL	55	F	SNG	86/12	NCG	141/12	FOLL.ADE
70	RAMZAN	45	F	MNG	102a/12	NCG	186/12	MNG
71	RAJAMANI	27	F	MNG	120/12	NCG	176/12	PAP.CA
72	THENNAMMAL	46	F	MNG	1823/11	NCG	198/12	MNG
73	BAKIYAM	60	F	CA.THYROID/MNG	123a/12	PAP.CA	215/12	PAP.CA
74	MARIYAMMAL	37	F	MNG	151/12	NCG	481/12	HASH.THY
75	SELVI	23	F	MNG	153/12	NCG	524/12	MNG
76	PRABA	20	F	MNG	155a/12	NCG	259/12	FOLL.ADE
77	JEYANTHI	30	F	SNG	156a/12	NCG	260/12	PAP.CA(FV)
78	SARASWATHY	56	F	MNG	169/12	NCG	289/12	MNG
79	PANDIYAMMAL	22	F	SNG	75/12	NCG	344/12	FOLL.ADE
80	VALLI	43	F	MNG	209/12	FOLL.NEO	728/12	MNG
81	RAMU	45	M	MNG	61/12	FOLL.NEO	449/12	MNG
82	SELVI	28	F	MNG	274/12	NCG	628/12	MNG
83	UDAYA KUMAR	35	M	MNG	277/12	FOLL.NEO	513/12	FOLL.ADE
84	MALLIGA	34	F	MNG	287a/12	NCG	523/12	MNG
85	MUTHIAH	50	F	MNG	288a/12	NCG	544/12	MNG
86	LATHA KAMATCHI	32	F	MNG	303/12	LYM.THY	594/12	FOLL.ADE
87	VASANTHI	48	F	COLLOID GOITER	363/12	HASH.THY	843/12	HASH.THY
88	PUSPHAM	28	F	MNG	364/12	LYM.THY	957/12	HASH.THY
89	RAJESHWARI	54	F	MNG	194/12	NCG	716/12	HASH.THY
90	ANGALA ESWARI	25	F	SNG	173/12	NCG	727/12	FOLL.ADE
91	AKKAMMAL	23	F	MNG	182/12	HASH.THY	1211/12	HASH.THY
92	VASANTAMALAI	48	F	MNG	313/12	LYM.THY	863/12	HASH.THY
93	RAJA	46	F	MNG	445a/12	NCG	853/12	FOLL.ADE
94	PANCHAVARNAM	45	F	SNG	467/12	NCG	976/12	FOLL.ADE
95	ADILAXMI	26	F	SNG	518/12	FOLL.NEO	1418/12	FOLL.ADE
96	SELVI	38	F	MNG	189/12	NCG	1036/12	MNG
97	MUTHULAXMI	33	F	MNG	622/12	HASH.THY	2218/11	HASH.THY
98	KATHIJA BANU	48	F	SNG?/CA.THYROID	645/12	PAP.CA	1416/12	PAP.CA

99	NAGAMMAL	58	F	COLLOID GOITER	654/12	LYM.THY	1519/1	MNG
100	MALATHY	15	F	MNG	671/12	NCG	1999/12	MNG
101	MURUGAN	34	F	MNG	705/12	NCG	1589/12	FOLL.ADE
102	KODDAMMAL	60	F	SNG	714/12	NCG	1375/12	MNG
103	RAJAMANI	65	F	MNG	664/12	GRA.THY	1417/12	GRA.THY
104	PUSPAM	25	F	MNG	727/12	HASH.THY	1419/12	HASH.THY
105	VIJAYA	68	F	MNG	732/12	NCG	1430/12	HASH.THY
106	RAJENDRAN	69	M	MNG	691/12	NCG	1431/12	MNG
107	JANAKI	45	F	MNG	738/12	NCG	1959/12	MNG
108	KARUPIAH	55	F	MNG	570/12	NCG	1631/12	MNG
109	ESWARI	21	F	MNG	781/12	NCG	1630/12	MNG
110	RASIYA BANU	32	F	MNG	818/12	NCG	1632/12	MNG
111	PALANIYAMMAL	31	F	MNG	823/12	NCG	2027/12	MNG
112	CHANDRA	55	F	CA.THYROID	372/12	PAP.CA	1674/12	PAP.CA(MC)
113	PANDIYAMMAL	55	F	MNG	851a/12	NCG	1673/12	MNG
114	DHANALAXMI	63	F	MNG	869/12	HASH.THY	2307/12	MNG
115	NALLAMMAL	46	F	MNG	877/12	HASH.THY	1956/12	MEDU.CA(CLV)
116	PITCHAIYAMMAL	55	F	CA.THYROID	913 /12	PAP.CA	2026/12	PAP.CA(MC)
117	MEENAXI	30	F	MNG	934/12	NCG	2361/12	HASH.THY

MASTER CHART -B

S.No	NAME	AGE	SEX	CLINICAL DIAGNOSIS	FNAC NO	FNAC -DIAGNOSIS	TIC NO	TIC DIAGNOSIS	HPE NO	HPE DIAGNOSIS
1	MUTHAMMAL	70	F	CA.THYROID	1702/11	ANA CA.	4113a/11	ANA CA	4113/11	ANA CA
2	ABITHABANU	26	F	?CA.THYROID	1736/11	NCG	1873/11	PAP.CA	4201/11	PAP.CA
3	ANNALAXMI	43	F	SNG	1849/11	NCG	1849/11	NCG	4153/11	FOLL.ADE
4	SURULIYAMMAL	50	F	MNG	1865/11	NCG	1865/11	NCG	4188/11	MNG
5	CHITRA	24	F	MNG	1908/12	NCG	1908/11	NCG	4287/11	MNG
6	MUHUKUMAR	35	M	CA.THYROID	1911/11	PAP.CA	1914/11	PAP.CA	4311/11	PAP.CA
7	PALANIYAMMAL	48	F	MNG	1915/11	NCG	1978/11	NCG	4446/11	MNG
8	PETCHIYAMMAL	55	F	CA.THYROID	1968/11	PAP.CA	69/12	PAP.CA	131/12	PAP.CA
9	DHANAM	55	F	MNG	005/12	FOLL.NEO	005/12	FOLL.NEO	009/12	MNG
10	USHA	35	F	MNG	38/12	NCG	38/12	NCG	51/12	MNG
11	MAHESWARI	24	F	MNG	40/12	NCG	62/12	NCG	103/12	PAP.CA
12	MANIKA VALLI	26	F	COLLOID GOITER	49/12	NCG	240/12	HASH.THY	465/12	HASH.THY
13	MOKKAI	41	M	MNG	58/12	NCG	121/12	NCG	213/12	MNG
14	TAMILARASI	30	F	CA.THYROID	63/12	PAP.CA	63/12	PAP.CA	104/12	PAP.CA
15	PANDIYAMMAL	60	F	MNG	124a12	NCG	124/12	NCG	214/12	MNG
16	RAMZAN	45	F	MNG	102a/12	NCG	102/11	NCG	186/12	MNG
17	THENNAMMAL	46	F	MNG	1823/11	NCG	122/12	NCG	198/12	MNG
18	BAKIYAM	60	F	CA.THYROID/MNG	123a/12	PAP.CA	123/12	PAP.CA	215/12	PAP.CA
19	MARIYAMMAL	37	F	MNG	151/12	NCG	263/12	HASH.THY	481/12	HASH.THY
20	SELVI	23	F	MNG	153/12	NCG	298/12	LYM.THY	524/12	MNG
21	PRABA	20	F	MNG	155a/12	NCG	155/12	NCG	259/12	FOLL.ADE
22	JEYANTHI	30	F	SNG	156a/12	NCG	156/12	NCG	260/12	PAP.CA (FV)
23	SARASWATHY	56	F	MNG	169a/12	NCG	169/12	NCG	289/12	MNG
24	PANDIYAMMAL	22	F	SNG	75/12	NCG	183/12	FOLL.NEO	344/12	FOLL.ADE
25	VALLI	43	F	MNG	209/12	FOLL.NEO	389/12	NCG	728/12	MNG
26	RAMU	45	M	MNG	61/12	FOLL.NEO	234/12	NCG	449/12	MNG
27	SELVI	28	F	MNG	274/12	NCG	314/12	NCG	628/12	MNG
28	UDAYA KUMAR	35	M	MNG	277/12	FOLL.NEO	279/12	FOLL.NEO	513/12	FOLL.ADE
29	MALLIGA	34	F	MNG	287a/12	NCG	287/12	NCG	523/12	MNG
30	MUTHIAH	50	F	MNG	288a/12	NCG	288/12	NCG	544/12	MNG
31	LATHA KAMATCHI	32	F	MNG	303/12	LYM.THY	303/12	FOLL.NEO	594/12	FOLL.ADE
32	VASANTHI	48	F	COLLOID GOITER	363/12	HASH.THY	436/12	HASH.THY	843/12	HASH.THY
33	PUSPHAM	25	F	MNG	364/12	LYM.THY	627/12	HASH.THY	1419/12	HASH.THY
34	RAJESHWARI	54	F	MNG	194/12	NCG	380/12	LYM.THY	716/12	HASH.THY
35	ANGALA ESWARI	25	F	SNG	173/12	NCG	388/12	FOLL.NEO	727/12	FOLL.ADE

36	AKKAMMAL	23	F	MNG	182/12	HASH.THY	650/12	HASH.THY	1211/12	HASH.THY
37	VASANTH MALAI	48	F	MNG	313/12	LYM.THY	863a/12	HASH.THY	863/12	HASH.THY
38	RAJA	46	F	MNG	445a/12	NCG	445/12	FOLL.NEO	853/12	FOLL.ADE
39	ADILAXMI	26	F	SNG	518/12	FOLL.NEO	628/12	FOLL.NEO	1418/12	FOLL.ADE
40	SELVI	38	F	MNG	189/12	NCG	545/12	NCG	1036/12	MNG
41	KATHIJA BANU	48	F	SNG?/CA.THYROID	645/12	PAP.CA	725/12	PAP.CA	1416/12	PAP.CA
42	NAGAMMAL	58	F	COLLOID GOITER	654/12	LYM.THY	776/12	NCG	1519/1	MNG
43	KODDAMMAL	60	F	SNG	714a/12	NCG	714/12	NCG	1375/12	MNG
44	RAJAMANI	65	F	MNG	664/12	GRA.THY	724/12	GRA.THY	1417/12	GRA.THY
45	RAJENDRAN	69	M	MNG	691/12	NCG	740/12	NCG	1431/12	MNG
46	JANAKI	45	F	MNG	738/12	NCG	805/12	NCG	1959/12	MNG
47	KARUPIAH	55	F	MNG	570/12	NCG	816/12	NCG	1631/12	MNG
48	ESWARI	21	F	MNG	781/12	NCG	817/12	NCG	1630/12	MNG
49	RASIYA BANU	32	F	MNG	818/12	NCG	818/12	NCG	1632/12	MNG
50	CHANDRA	55	F	CA.THYROID	372/12	PAP.CA	843/12	PAP.CA	1674/12	PAP.CA(MC)
51	PANDIYAMMAL	55	F	MNG	851a/12	NCG	851/12	NCG	1673/12	MNG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INTRODUCTION
The Thyroid gland is unique among endocrine glands. It is the largest of all the endocrine glands and it is superficial in location(49). It is the only gland which is easily approachable to direct physical,cytological and histopathological examination.
The thyroid gland is affected by a variety of pathological lesions that are manifested by various morphologies including developmental, inflammatory. hyperplastic and neoplastic pathology which are quiet common in clinical practice.
Lesions of thyroid are so common and it presents as diffuse enlargement or solitary or multiple nodules. As the Incidence of malignancy presenting on thyroid lesion is quiet low when compared with the overall incidence of thyroid nodular lesions. Emphasis is placed upon finding diagnostic modalities that may improve the ability to differentiate between nonneoplastic and neoplastic lesions and differention of benign and malignant lesions . In 1930 Martin and Ellis first reported the diagnosis of thyroid lesions using aspiration cytology..[1]So Fine Needle Aspiration Cytology has been established as the investigation of choice in
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A CORRELATIVE CYTOLOGICAL AND HISTOPAHOLOGICAL STUDY ON LESIONS OF THYROID GLAND DISSERTATION SUBMITTED FOR M.D. (Branch III) PATHOLOGY MARCH 2013 THE TAMILNADU DR.M.G.R.MEDICAL UNIVERSITY CHENNAI – TAMILNADU Madurai 20. 20-12-2012 Department of Pathology, Madurai Medical College and Government Rajaji Hospital, Madurai. CERTIFICATE This is to certify that the dissertation entitled “A CORRELATIVE CYTOLOGICAL AND HISTOPAHOLOGICAL STUDY ON LESIONS OF THYROID GLAND” presented herewith by Dr.R.SIVAELANGOVAN to the faculty of Pathology. The Tamilnadu Dr.M.G.R.Medical University, Chennai in partial fulfillment of the requirement for the award of M.D degree in Pathology is a bonafide work carried...